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The Problem of London's Drainage

A. F. GREEN

THE DEVELOPMENT OF MODERN CITIES is dependent upon two over-riding considerations: the provision of an adequate water supply, and the subsequent removal of that water without undue offence. It is the purpose of this paper to show how the latter has been effected in London.

For the purpose of drainage, London has always enjoyed certain advantages, though some of these have diminished with the development of the area, and of its surroundings. First and foremost is the fact that it stands on the largest river in the country, with a natural flow varying between, say, 400 million gallons per day during the driest part of the summer and up to ten times that figure during the winter. The fact that the London area drains into the tidal portion of the river reduces, to some degree, the benefit of the upland flow and, as will be seen later, this fact has become of increasing importance.

Second, the ground on either side slopes down towards the river, though less steeply on the south side than on the north. The flood plain of the river within the area is relatively narrow, though the area between Westminster and Bermondsey on the south side was originally marsh land, and was reclaimed only by embanking.

Natural drainage was effected by tributaries flowing in the valleys on both sides of the river: by Counters Creek, the Ranelagh, the Tyburn, the Fleet, the Shoreditch, the Black Ditch and the Lea on the north side and by Beverley Brook, the Wandle, Falcon Brook, the Effra, and the Ravensbourne and its tributaries on the south side. Of these, only the Lea remains as a river on the north side, whilst all but the Effra have survived on the south side.

In earliest times, drainage of the town was by channels running beside the roads, and these carried off the surface water, discharging into the natural watercourses. It was early made an offence to discharge into the road drains anything of an offensive character, and numerous early enactments were directed towards preventing this. Difficulty in implementing these enactments was soon experienced, and authority was vested in various bodies from time to time, but with little success.

Water for domestic use was drawn from the river at various points within the metropolitan area, but during the early stages of development, while London remained unindustrialized, the quantity was relatively small. Disposal of domestic soil water was by means of cesspools, which were emptied periodically, and it was an offence to discharge any domestic liquids into the road drainage channels.

➤ Mr. Green is Principal Scientific Officer in the Scientific Branch of the London County Council. His paper was delivered at the Annual Conference of the Association in London on 5th January, 1956.

As time went on, the street drains, originally heaped-up water-courses, were covered in, and the tributary streams were first conduited and later covered in, but the set-up remained essentially the same until the beginning of the last century. Around 1807, however, there occurred an event which was destined to have a profound and far-reaching effect upon the drainage of London. This was the introduction of the water-closet, and the large addition of water threw an impossible load on the cesspools. To afford relief, it was at first permitted to connect the cesspools with the only available outlets, the street-drains, and by 1847 this had been made compulsory. Thus, the combined system of drainage was a result of necessity rather than of any particular merit.

From around 1810 onwards the volume of water discharging into the sewers began to increase rapidly; it became necessary to increase the numbers of sewers, and by 1847 there were some 35 major sewers running roughly at right angles to the line of the river. All these sewers discharged untreated sewage direct to the river within the metropolitan area, and the effect of this was soon evident. By 1830, the middle reaches had become foul, and the deposition of increasing quantities of stinking mud, exposed and noxious at each low tide, attracted growing public attention. Moreover, throughout all this time, five of the large water companies were drawing their water from the very reaches into which great quantities of sewage were being daily poured.

Public attention was early called to this situation by a pamphlet, which appeared in 1827, entitled "The Dolphin," in which was a sketch depicting the dolphin marking the intake of the Grand Junction Water Company. In the background are Chelsea Hospital and the pumping works of the company, separated by the great Ranelagh sewer, from which a flood of sewage poured into the river abreast of and within about three yards of the dolphin. In 1851 a monograph by Dr. A. H. Hassall entitled "A Microscopic Examination of the Water supplied to the Inhabitants of London," showed conclusively that London's drinking water contained enough organisms of sewage origin to justify the author's statement that ". . . the inhabitants of the Metropolis are made to consume in some form or other a portion of their own excrement, and, moreover, to pay for the privilege."

Three great cholera plagues smote the town, in 1831–2, 1848–9, and 1853–4, with massive loss of life, and by 1855 public feeling was being confirmed that there was a close connection between the epidemics and the water supply. The original design of the sewers, with their outlets at about low water level, closed them off before and after high water. In certain tidal states, heavy rain surcharged the sewers and caused flooding of the houses with sewage. It had not escaped notice that the incidence of cholera during epidemics was greatest in the districts of Southwark and Lambeth which were drained with difficulty.

The foul state of the river in the middle 1840's was the subject of debates in Parliament, and several commissions were appointed between 1848 and 1855. The remedy they all suggested was broadly the same—the interception of the sewage from the existing sewers and its conveyance to a point lower down the river. There was, however, endless and acrimonious controversy about the method of doing so, while the condition of the river became steadily worse. The first Commission, immediately after its appointment in 1848, took cognizance of the large number of cesspools, estimated at 200,000 still existing in the middle of the populous districts. The Commissioners resolved to exercise their powers by doing away with them, their contents being pumped out and discharged to the Thames. Water-closets were compulsorily connected by house-drains to the main sewers, which then discharged into the Thames in the heart of London. The effect of this wholesale change soon became manifest in the foul state of the river, and the evil smell from the water was intensified by that arising from the great deposits of sewage matter on the large, flat mud banks left dry at low water. Subsequent Commissions, however, were unable to agree as to the most satisfactory solution to the problem and either resigned or were superseded, until, in 1855, the Government passed the Metropolis Local Management Act. Its object was twofold: firstly, to create a number of District Boards of Works, to have responsibility for the construction and maintenance of local sewers. Secondly, to form a Corporate Body, to be called the Metropolitan Board of Works, elected by the rate-payers. Its duties were to be of a fairly general character, but its most important function was to take charge of the main sewers, and in particular to construct works for a comprehensive system of main drainage. Two sections of this Act were destined to have a profound effect on the ultimate drainage of London. The first vested the sewers in the Metropolitan Board of Works and placed on that body the responsibility for constructing works to keep the sewage out of the Thames in the vicinity of London. The second made compulsory the approval of the Government for the plans of the Board.

The Metropolis Local Management Act came into operation just one hundred years ago, in January 1856, and the Board immediately proceeded to the consideration of the whole question of the drainage of the metropolis, and instructed its chief engineer Mr. (later Sir Joseph) Bazalgette to report, at the earliest possible moment, as to the works necessary to accomplish the object.

Mr. Bazalgette, having the advantage of access to the plans formulated by earlier Commissioners, evolved a plan for submission to the Metropolitan Board of Works which comprised two main features—first, the construction of embankments to contain the river within the metropolis; this would have the twofold advantage of removing the unsightly mud-banks and of increasing the velocity in the metropolitan reaches and preventing deposition of suspended matter. Second, he proposed the construction of intercepting sewers, running roughly parallel to the river and at right angles to the existing main sewers, to intercept all the sewage flowing in the main sewers and to convey it to some point lower down the river. He planned to discharge it at Barking Creek on the north side and in Plumstead marshes on the south side.

On its submission to the Commissioners of Works and Public Buildings, on 3rd June, 1856, the First Commissioner, Sir Benjamin Hall, objected to the plan on the grounds that it did not conform to the spirit or the letter of the Act in its failure to avoid discharge into the river in the metropolitan area, and referred it back for amendment. Bazalgette's modified plan providing for outfalls at Rainham Creek (on the north bank) and near Jenningtree Point (on the south bank) was submitted by Sir Benjamin to a Board of Referees, which, in a report in July 1857, accepted the plan for intercepting sewers, but recommended a drastic change in the siting of the outfalls—that on the north side to be at Mucking and that on the south side at Higham Creek, conveyance to be by a main channel of suitable dimensions on each side of the river, 20 and 16½ miles long respectively. A fall of 6 inches per mile was specified, which was estimated to give a velocity of 2½ feet per second, and provision was made for the construction of tidal reservoirs to increase this velocity if necessary in dry weather. This plan was rejected by Bazalgette, firstly because of its excessive cost to the London ratepayers, and secondly that the channels would terminate at depths of 17 and 16 feet below low water, which would render their draining impossible. He then recommended the placing of the outfalls at Barking Creek and Crossness, with an alternative site on the south side on the Greenwich marshes, near the terminus of the river branch of the North Kent Railway.

Meanwhile, the state of the river continued to deteriorate daily, and excited great alarm and indignation. During 1858, the subject was repeatedly noticed in Parliament, and on the 2nd August an amending Act was passed, giving to the Metropolitan Board of Works the authority to carry out whatever works they considered necessary, without further reference to Parliament. Immediately after the passing of the Act, the Metropolitan Board of Works took the matter earnestly in hand. The plan they proposed was, broadly, to avoid as far as possible costly pumping, by utilizing the natural configuration of the land to provide the necessary fall to the intercepting sewers. On the north side there were two well-defined terraces, the Taplow and the Boyn Hill, and it was planned to make the utmost use of these features. Three intercepting sewers were proposed; a High Level Sewer with its summit at Hampstead and Highgate, and passing by Hackney and Stratford to Barking Creek, to act by gravitation alone; a Middle Level Sewer, beginning in the west at Kensal Green, passing along the Taplow Terrace by way of Oxford Street, Clerkenwell Road and Bethnal Green to join the High Level Sewer at Abbey Mills,

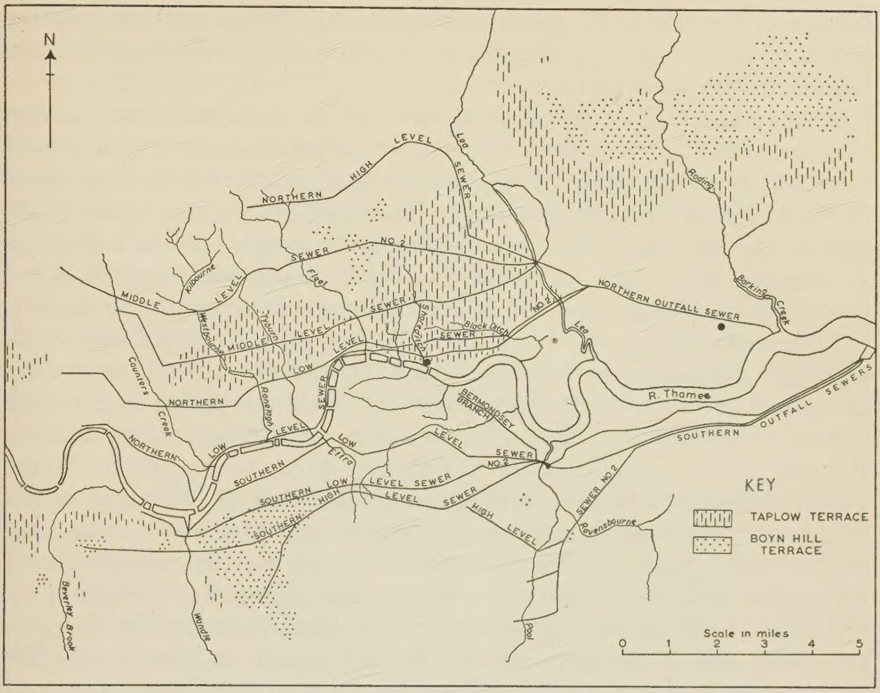

Fig. 1.—The present sewerage system of London.

Stratford, also to act by gravitation; a Low Level Sewer, beginning at Chiswick and passing through Chelsea, near the river to Grosvenor Road, Pimlico. Here its contents were to be pumped into another conduit at a higher level which was to run along the northern Thames embankment as far as the Tower, where it would strike off to the north-east through Stepney to Abbey Mills where its contents would be pumped up to the level of the Middle and High Level Sewers. From Abbey Mills the three sewers were to run side by side in embankment, to discharge by gravity at the Northern Outfall Works at Barking Creek.

On the south side, the terraces are less well defined, and only two intercepting sewers were proposed; a High Level Sewer, with its summit in the Boyn Hill Terrace at Balham, passing via Clapham, Brixton, Camberwell and New Cross, under Deptford Creek to continue by Greenwich, Woolwich and Plumstead Marshes to a pumping station at the Southern Outfall Works at Crossness. The sewage would reach that point by gravitation. A Low Level Sewer was to begin in the Taplow Terrace at Putney, and pass via Wandsworth, Battersea, Vauxhall, Kennington, Peckham and New Cross, to a pumping station on the Ravensbourne near Deptford, where the contents were to be pumped into a Southern Outfall Sewer. At a point near Nine Elms there was to be a pumping station to lift the contents of the Effra into the Low Level Sewer, and there was to be a branch sewer to drain the low-lying districts of Bermondsey and Rotherhithe to the pumping station at Deptford. At the Southern Outfall Works at Crossness, the whole of the sewage was to be pumped to the height necessary to allow it to flow into the river.

An examination of the rainfall figures had shown that, in normal times, on only 14 to 21 days in the year did the amount of rain exceed ¼ inch in 24 hours, though exceptionally the figure had risen to 30 days. Mr. Bazalgette therefore decided to fix the capacity of his intercepting and outfall sewers to allow for the discharge proper, plus a rainfall of ¼ inch per day. This represented a total of 294 million gallons per day on the north side, and 126 million gallons per day on the south side.

One result of this policy was that allowance had to be made for the fact that, during times of heavy rainfall, the quantity of water entering the sewers would exceed the capacity of the intercepting and outfall sewers to carry it off. There was, therefore, no alternative but to allow the superfluous quantity to be discharged direct to the river. At the points of interception of each of the original sewers, there was formed a weir, so that when the level in the sewer rose above a certain predetermined height (representing some 6 times the dry weather flow) the surplus spilled over the weir and was discharged direct to the river.

At the outfall works, the sewage was originally impounded in large reservoirs and discharged, without any treatment, to the river on the ebb tide. The result of this was merely to transfer the area of gross pollution from the heart of the metropolis to an area some miles lower down, and it very soon became evident that it was essential to remove as much as possible of the suspended matter from the sewage before discharging the liquid portion. Accordingly, in 1887, plans were put in hand for the construction of settling channels at the two outfall works. Initially they were operated on the fill-and-draw system, but this was soon superseded by continuous operation, obtained by the installation of weir walls at one end of the channel, over which the settled sewage fell as effluent, which was then discharged to the river.

Each year, the population of the London drainage area was increasing and this, together with an increasing industrialization of the region, resulted in an increasing demand for water, most of which reappeared ultimately as sewage. Moreover, the advent of the motor car at the beginning of this century produced an irresistible demand for waterproof roads. So the rapidly increasing built-up area, consequent on rising population, became a rapidly increasing impermeable area, and the combined effect of these factors was to increase largely not only the run-off area but also the rate of run-off. Consequently, between 1903 and 1910, it became necessary virtually to double the capacity of the intercepting and outfall sewers. This was done by constructing two additional sewers north of the river, one at middle level and one at low level, and by adding two outfall sewers between Abbey Mills Pumping Station and the works at Barking. On the south side, additional low and high level sewers were constructed.

At about the same time, an extensive programme of construction of additional storm relief sewers was entered upon. Generally, these sewers were below the intercepting sewers, and were designed to afford relief to the latter. As in the case of the original sewers, weirs were constructed to ensure that up to six times the normal dry weather flow passed down the intercepting sewers, but that quantities in excess of this amount spilled over the weir and passed via the storm relief sewer direct to the river. In this way, the discharge of crude sewage into the river was kept to the reasonable minimum.

A considerable area on both sides of the river is below the level of High Water of Ordinary Spring Tides, and in the event of heavy rainfall occurring at around High Water these districts had been subject to flooding, at times very severe. To alleviate this, six additional pumping stations were constructed, solely for the purpose of pumping storm water.

By reason of the increasing population and industrialization of the area, the sewage has continued to increase in volume over the years; concurrently with this increase, there has been a greater abstraction of water from the rivers Thames and Lea. This has produced a situation in which a diminished upland flow is available to sweep out an increased volume of sewage. Moreover, the sewage is discharged into the tidal portion of the river, so that it oscillates to and fro with each tide, moving seawards by a distance determined by the upland flow. As the tides are making from neaps to springs, the volume of water in the tidal portion of the river increases by some 700 million gallons daily. If this additional volume is not supplied by the upland flow it must come in from the sea, and the sewage will be driven up the river. Normally, the fresh water flow over the weir at Teddington falls below 700 million gallons daily during five months of the year, and during alternate weeks throughout this period the sewage is not only oscillating tidally, but is also being forced up into the metropolitan area by the inflow of sea water.

From the foregoing it will be seen that the drainage of London into a tidal estuary offers a very different problem from that of drainage into a non-tidal river. Because the river is tidal, the sewage remains in the river a great deal longer than would be the case were the flow of the Thames unidirectional. The flow of sewage into the Thames at the Northern Outfall Works is the largest single tributary into the river, and, since the discharge of such large quantities of sewage at one point has, over the years, thrown an overwhelming burden on the self-purifying capacity of the river, it has been necessary to construct large and costly purification plant in order to lighten very greatly the pollution load on the river.

During the years 1930–8, plant was constructed at the Northern Outfall Works, to give secondary treatment, by means of the activated sludge process, to part of the effluent from the primary sedimentation channels, and since that time some 40 million gallons per day have been given this additional treatment. It was hoped that this would arrest the gradual deterioration in the condition of the river, but these hopes were, unfortunately, not fulfilled. So, after the recent war, it was decided to carry out drastic alterations and improvements at both Outfalls, at a cost estimated to exceed £12 million. These improvements were considerably delayed by shortages of equipment, and by inability to obtain ministerial consent; but, in 1949, work was commenced at the Northern Outfall Works on new primary sedimentation tanks, and these were brought into operation about the middle of 1955, producing an effluent of very much better quality than that produced by the original channels, constructed in the 1880's. Meanwhile, work has been commenced on a second stage of activated sludge plant, to give secondary treatment to a further 60 million gallons per day, so that, when this plant is brought into service, probably in 1958, half the total sewage received at the Northern Outfall Works will receive both primary and secondary treatment.

At the Southern Outfall Works, plans are already in hand for the construction of activated sludge plant to give secondary treatment to the whole of the sewage received there, and this plant should be in operation by 1963. It is hoped that the combined effect of these developments at the two Outfalls will be sufficient to keep the river free from offence; but should this not prove to be so, the plant at the Northern Outfall Works has been so designed that additional units of activated sludge plant, to give secondary treatment to the whole of the sewage, can be added without any major alterations being necessary to the existing works.

There is no reason for thinking that, at any foreseeable date, the existing sewerage system might prove inadequate to meet the demands made upon it. Recent trends have been in the direction of moving part of the population to areas outside the drainage area of London, and the flow of sewage to the two Outfalls has shown a very slight tendency to decrease. It seems reasonable to suppose that this tendency will continue for a time, and may even accelerate. As far as the purification plant is concerned, the future is much less clear. Modern industrial development, particularly in the case of light industries, has brought with it the increasing problem of the disposal of trade wastes. It may well be that, in the not very distant future, this will become a serious problem. It can be stated with reasonable certainty that this sort of problem is always capable of solution—at a cost; and financial considerations have always a very great bearing on the question of sewage purification.

In conclusion, I wish to thank the Medical Officer of Health (Dr. J. A. Scott) and the Chief Engineer (Mr. J. Rawlinson) for permission to publish this paper.

Trends in the Geographical Pattern of Disease

A. LESLIE BANKS

INTRODUCTION

GEOGRAPHERS ARE, BY DEFINITION, interested in the earth as a whole, and it seemed to me that I could most usefully repay your kind invitation by attempting to portray the general pattern of disease throughout the world, with particular reference to future trends.

When one surveys the health and welfare of mankind in highly industrialized communities one is struck by two facts. Firstly, the great increase in the number of people living to mature life as a result of environmental improvements, better housing, education, and especially success in the control of the killing diseases of infancy, childhood and adolescence. Secondly, the principal cause of death is now some disaster of the cardiovascular system, of the arteries supplying either the heart or the brain. This is less easy to explain. The main difference between prehistoric man and ourselves would, I think, be found in the increasing control which the forebrain now exerts over the rest of the body. Memory, intelligence, and foresight, have enabled man so to triumph over his environment that in certain communities he may no longer be compelled to exert himself physically. On the other hand he is subjected to mental stresses quite different from those requiring the instant reflex action of the animal world.

Speaking generally, it is possible to recognize in ancient as in modern times diseases which spread directly from man to man, those conveyed by insects or other vectors, accidents and disabilities due to wear and tear, diseases due to malnutrition, and those caused by new growths.

The pattern of disease became recognizable on a world-wide scale (save for variations due to climate) by early medieval times, for the conditions which we now associate with tropical and sub-tropical areas were all to be found in Europe, and indeed Britain. It is not surprising, therefore, to find that the so-called temperate climate diseases have great significance in the tropics to-day. The overall picture was that of high death-rates in infancy and childhood, many diseased adults, and few old people.

THE EMERGENCE OF TWO WORLDS

The general picture of disease began to change in Europe about three hundred years ago, when the voyages of discovery, together with the

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➤ Professor Banks occupies the chair of Human Ecology in the Department of the same name in the University of Cambridge. This summary has been prepared by him from an address entitled "Some Medical Aspects of Geography" given to the Association at its Annual Conference in January 1956. The full text is published in the *Geographical Journal*, vol. 122, part 2, 1956, pp. 167–75.

development of industrialization, led to a rise in social standards and improvements in environment and nutrition.

With the growth of industrialization on a massive scale diseases due to defective physical environment were gradually brought under control, but those due to a faulty biological and social environment increased.

Overcrowding, faulty working conditions, long hours of employment, casual labour, drunkenness, ignorance and brutality, all played their part in establishing a new and more vicious pattern of disease. Industrial accidents and poisoning, the common infections, and above all tuberculosis, made life brief and uncertain.

It is only within the past few years that we have begun to shake off the combined effects of the ancient pattern of disease and the aggravation of this produced by industrialization. In general, the picture for western countries to-day is that of communities with a relatively low birth-rate, low infant mortality, healthy children and adults, and many old people. We are moving into an era when the principal causes of death are those of later life, and much of the illness is mental rather than physical.

Broadly speaking, the ancient pattern has persisted in many countries, where the killing diseases of temperate climates, in addition to those resulting from an adverse environment, may still be found. Thus malaria, pneumonia, tuberculosis, syphilis, the water-borne infections, dust and insect-borne diseases, combine with the parasitic infestations to cause untold misery. Above all may be found the diseases due to malignant malnutrition, of which *kwashiorkor* in Africa is one example. Some of the results are immediately obvious. In such countries may be found high infant mortality rates, the proportion of diseased adults is high, and the expectation of life is short, especially for women.

Between the First and Second World Wars there were many new medical discoveries, antibiotics, sulphonamides, new insecticides, and means of immunization against many diseases hitherto regarded as uncontrollable. After the Second World War there was a great expansion of interest on the part of the western countries in the rest of the world. One result was the development of international teams, capable of moving into a country to attack disease on a massive scale. In addition, all countries are making efforts on a national scale to improve the health and welfare of their members, and the re-awakening of voluntary effort is not to be despised. The women are now asking not only for maternity and child welfare services but also for better health services in general, and pure and adequate water supplies in particular. It is indeed difficult to exaggerate the importance of water in connection with health.

The resulting change in the pattern of disease in many of the so-called backward countries is leading to a dangerous disturbance of the existing biological balance, with high birth-rates, lowered infant mortality rates, and many more people surviving to adult life.

THE FUTURE

It is only a question of time before it becomes one world again from the medical point of view. It may take 30, 50, or possibly 100 years, but I do not think it will be much more. I do not mean to imply that there will be a uniform pattern of disease, for that would take no account of variations of climate and the like, but I believe that the means of controlling disease, and knowledge of the ways of promoting health, will be universally applied.

If and when that comes to pass man will be thrown back on his elementary requirements, food, water, shelter and health, but for vastly increased numbers. Already the current problems are no longer primarily medical but social.

I have learned from Professor Steers of your desire for long-term hydrological studies. It has occurred to me that you might usefully project your studies into the past, as well as being concerned with the present and future. Why, for instance, have certain countries, ports or territories, known to be prosperous and fertile in ancient times, been abandoned? If it was because of malaria or some other disease which we can now control then surely such territories might be brought into use again.

I would like to see a research project set up whereby the physical characteristics of an area might be studied in an orderly sequence, including past history, climate, water supplies, and other natural resources, together with the customs and habits of the people, and their reactions to disease and its control. With such a comprehensive assessment we should be in a strong position to make recommendations for a balanced future development. Equally important we should have learnt the technique of working together.

The geographer relies extensively on maps in his work, and here also there is a useful field for joint exploration. Such matters as local density of population, the state of nutrition and health, and the standards of living, are all of importance and can be depicted.

There is also an urgent need for teaching. One of the greatest needs of the world is for leaders with a sense of responsibility and integrity, and I have thought for some time that such men are best taught by the people who can show why such standards are necessary. Geographers are particularly well qualified to teach the need for knowledge of, and leadership in, the development of the natural and human resources of a country or community.

The co-ordination of the activities of those developing a country is of the utmost importance. There seems to me to be a vital part for geographers to play, especially those whose responsibility it is to teach.

The Chinese Fishing Industry

H. ROBINSON

FISH IS AN IMPORTANT ARTICLE OF DIET in China. A festive occasion or the rich man's table would scarcely be complete without such delicacies as bêche-de-mer, shark's fins or edible seaweeds, while in many coastal districts and river and lake-side localities fish is a valuable addition to the all-too-often monotonous food supply. The consumption of fish and marine products varies greatly between place and place but is estimated at about 7 lbs. per capita a year.[1]

As the most cheaply produced form of protein food, fish is important as a foodstuff and in China it is especially important on this account firstly, because of the general shortage of protein foods and, secondly, because of the religious proscription of animal foods. The Chinese, like most Oriental peoples, are less fastidious than Westerners about the kinds of fish they eat and most species are consumed. Marine types include herring, mackerel, bass, sea perch, bream, skate, tuna, mango, pomfret, eel and shark: all are much in demand. In addition, large quantities of shellfish (crabs, lobsters, cuttlefish, oysters, mussels), shrimps and prawns, squid and seaweed and other aquatic products are consumed.

Though China has a substantial production of fish the total catch in relation to the size of the country, to the length of the coastline and to the numbers of people is meagre; the per capita output is small hence the per capita consumption is small. As a result of the general shortage of food in China—consumption is little above subsistence level—there is every likelihood that her production of fish and aquatic products will steadily increase in the future. R. L. R. Morgan, discussing the world problem, has written: "It is fairly safe to prophesy that the greatest and most marked increase will occur in those areas where nutritional values are low or unbalanced and where the maximum potential output of the fishery resources has by no means been reached."[2] China is one of such areas.

THE STATE OF THE INDUSTRY

Although China has a low production/population ratio the aggregate output, in normal times, was substantial and her fishing fleet of considerable size. In 1934, before the Sino-Japanese War, East China possessed 288 steam vessels, 68,807 sea-going fishing junks and an unnumbered amount of fresh-water fishing craft which probably ran into hundreds of thousands.[3] As a result of the Sino-Japanese War (1937–45) and the difficulties of the Kuomintang administration the

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fishing fleets became depleted and neglected. In 1947 only 125 steam vessels and 31,509 sea-going junks were left:[4] of these a large proportion were damaged and unfit for service. The fishing industry of the Chousan Archipelago, hitherto of first importance, in particular had been almost completely destroyed.

With the cessation of hostilities and the establishment of the new régime in 1947 the way was open for the resuscitation and development of the fishing industry. Since the foundation of the People's Government assistance of every kind has been extended to the fishing community, if reports are to be believed. Administrative organs at various levels have been established, fishermen's producer co-operatives have been organized and help given to the fishers who operate individually. By 1951 the fishing fleets had been substantially repaired and implemented and though their numbers were not up to the pre-war level they showed a very considerable increase on the immediate post-war figure; the numbers engaged in fishing along the East China coast were, according to official returns, given as 58,404 fishing boats, 56,080 sea-going fishing junks and 131 motor vessels.[5] Professor J. E. Spencer gives a figure (date 1954) of over 100,000 sailing junks engaged in full-time fishing.[6] Since 1950 the repair and replacement of fishing craft seems to have been effected at an increasingly accelerated pace—a fact borne out by the increasing annual catch.

TYPES OF FISHING

The fisheries of China may be divided into three categories, viz., deep-sea, inshore and inland. Though the Chinese are great and intrepid fishermen they have not wandered far from their coastal waters, hence deep-sea fishing, that is, fishing by boats which leave the littoral and remain at sea for several days, is not highly developed. It is likely that the deep-sea fishery will become developed to a much greater degree in the future; as the industry becomes more organized and as steam or motor vessels are increasingly introduced the deep-sea fisheries will receive a tremendous impetus and expand. At present, however, China has few large, powered drifters or trawlers and no deep-sea fishery comparable to that of Japan whose fleet ranges far afield in the Pacific. Few Chinese fishing vessels even go so far as the edge of the continental shelf. In the marginal seas of China—the Yellow, East and South China Seas—one of the great demersal as well as pelagic fisheries of the world exists and offers a great potential storehouse of food for the millions of land-bound Chinese. These seas, moreover, provide a great wealth of species since they lie in the transitional zone between the cool northern waters and the warm tropical seas of the south with their respective aquatic life.[7]

Coastal or inshore fishing, in direct contrast to deep-sea fishing, is very highly, though not systematically, developed. Several hundred thousand Chinese are engaged in the inshore fishing industry. The degree of development of the inshore fishery is related basically to two geographical conditions, coastal topography and pressure of population. As a result of the combination of extensive agricultural plains, difficult access to the sea and shallow, shelving, smooth, muddy shores, the peoples of the coastal areas north of the mouth of the Yangtze (peninsular Shantung excepted) have not shown any special interest in fishing; south of the Yangtze, on the other hand, the partially submerged broken coast with its wealth of small, protected coves, spacious bays and off-shore islands, its shortage of cultivable land, its overcrowding and its easily-acquired timber for boat-building, has tended to turn the attention of the people to the sea with the result that fishing is the most distinctive occupation of the southeast coastal region.[8] The fringing seas at all seasons are spattered with thousands of small fishing junks of distinctive local design, often gaily decorated.[9]

The third type of fishing is associated with inland waters, the lakes, rivers, canals and ponds. The fresh-water fisheries of the interior loom large in the peasant economy of many areas and provide a very valuable addition to the food supply. But valuable as they are, they are less important than the sea fisheries. The great inland lakes of Tungting, Poyang and Hungtze are rich in fish and aquatic life while many of the rivers literally teem with fish. The Yangtze and its tributaries are, for the most part, well stocked and natural conditions allow continuous replenishment. In many parts of western China, however, it is otherwise and the fish resources have become virtually exhausted. All stretches of water are assiduously fished. Many of the canals, such as those which criss-cross the low-lying land of, and bordering, the Yangtze delta, are used for fishing and fish breeding.[10]

A very notable development in China is pisciculture, said to go back to 2000 B.C. Fish culture is practised in many countries to increase the supply of protein food but is probably nowhere so highly developed as in China. Lakes, ponds, canals and even flooded rice fields are used for raising fish. In Chinese fish-farming the fertility is artificially increased by feeding organic residues to the fish; for example, most of the farmers of Kwangsi and Kwangtung who grow mulberry also, according to Cressey,[11] keep fish which are reared in ponds or canals and fed by the waste from the silk-worm cocoons. Carp breeding is most common but often several kinds of fish as well as molluscs and crustaceans are reared in the same waters, their differing food demands making for increased efficiency of the "farm." According to Bruce Bliven quoted by J. de Castro,[12] the raising of fish on organic waste, as is done in China, produces a "larger return than does the land itself used in the more orthodox way." Fish farming may result in production per acre being as great as, or in the case of carp greater than, that from cattle or pig-rearing.[13] Production of 1,000 lbs. of carp per acre has been attained and, according to Spencer,[14] yields in South China are the highest in the world.

FISHING LOCALE

The sea fishery is best developed in the Chousan Archipelago but is important off the coasts of Chekiang, Fukien and Kwangtung to the south and, further north, around the coasts of peninsular Shantung and the Gulf of Liaotung.

In the Gulf of Liaotung, Korea Bay and the Shantung area the chief fish caught are herring, cod, bream, skate, and sea perch. The granitic coasts of Liaotung and Shantung are broken and indented offering well-sheltered coves and creeks for numerous fishing villages. The low, muddy shores of the Gulf of Chihli and the alluvial coast south of Shantung peninsula as far as the mouth of the Yangtze are of little importance from the point of view of the fishing industry. The chief fishing bases in northern China are Dairen, Chefoo and Tsingtao.

In the Chousan Archipelago, a group of about one hundred islands, mackerel, flounders, skate, sardine, pilchard, tunny and bonito are important catches while oysters, prawns and shrimps are also harvested in quantity. The southeast coast, roughly between Ninghsien (Ningpo) and Hongkong, is greatly articulated with numerous bays providing a sequence of fine and beautiful harbours which have become the centres of many towns and hundreds of villages intimately engaged in maritime pursuits. Every coastal settlement has its fishing fraternity who catch tunny, mango, pomfret, gurnard, anchovy and sardine in the East China Sea. Ninghsien, Yungkia (Wenchow), Minhow (Foochow), Amoy and Swatow are the chief fishing centres. A very important fishery, largely cuttle, is based on Ninghsien[15] which is also famous as a fish-preserving centre; dried and salted fish are despatched to all parts of China from Ninghsien. The strong sea currents which run off-shore and sweep between Formosa and the mainland make navigation difficult, even dangerous, but the very difficulties of navigation have helped to train the most expert fishers and sailors on the entire 3,000-mile coast of China.

Hongkong, though not politically an integral part of China, might be mentioned here; it is an important centre of fishing but less so than formerly when it imported trepang and other marine products for re-export to China and sold much of its catch to the mainland. The nearby Portuguese settlement of Macao, now but a pale shadow of its former splendid self, still possesses a notable fishing and salt industry.

The Kwangtung coast, west of the Si Kiang delta, reproduces the characteristics of the southeast coast; it is much broken with numerous bays and protected by fringing islands from the summer monsoon, hence it presents opportunities for fishing and has developed valuable turtle, pearl, coral and salt industries. The pearl industry is somewhat localized being mainly restricted to the waters around the Luichow peninsula. Pearl culture, as distinct from the production of artificial pearls, dates back to the thirteenth century; for many centuries the Chinese have been in the habit of inserting small figurines of Buddha in oysters so that they would become plated with mother-of-pearl. Pearl culture takes place in mussels rather than in oysters and before the outbreak of the Sino-Japanese War China produced several millions of pearls a year in this way.[16] Chinese pearls do not compare with the finest products of the oyster nor is pearl culture as practised in Japan (due to the work of Kokichi Mikimoto who developed the technique of producing artificially cultured pearls scarcely distinguishable from 'natural' pearls) developed in China.

FISHING TECHNIQUES

Ingenuity is an outstanding characteristic of the Chinese and in nothing do they display this ingenuity more than in the methods they have devised to catch fish. In the more modern steam and motor vessels the usual types of drift and drag nets are used but among the individual peasant fishers who fish the inshore and inland waters all kinds of nets, seines, traps and other devices are used. At sea a common method is pair-trawling by junks. Along the shores of inland waters the dip-net method is popular. Dip-nets are of all kinds, varying from simple bag-nets which are dipped by hand to wide nets stretched on a bamboo frame and mounted on a fixture in the river bank. Dip-nets are also ingeniously mounted in the bows of sampans; the sampans are allowed to drift downstream with the current, the fisher all the while lowering and raising his net. Another type of net is the throw-net which is like a cone-shaped skirt of some thirty-feet circumference; it is expertly cast on to the water where it spreads out, gradually sinks and is then slowly dragged along the lake or river bed. Fishing by such techniques is a tedious business bringing, usually, small returns but the Chinaman is blessed with infinite patience and will spend the whole day continually lowering or throwing his nets in the hope of ensnaring passing fish.

Not only has the Chinaman's ingenuity led him to invent elaborate and complicated types of fishing-net but even to enlist the aid of animals. The fish-eating cormorant, for example, has been cleverly exploited from earliest times to catch fish. The birds are trained to bring back their catch to the boat; to prevent them swallowing the fish rings are slipped round their necks. Up to twenty or thirty cormorants may be used by a single fisherman. This enterprising method of fishing is fairly extensively practised; it is particularly popular with some south coast fishermen, is found on the Yangtze and around some of the inland lakes such as T'ai Hu.[17] Viscount Kelburn recounts seeing one old fisherman at Ichang who used an otter to scare fish into his net.[18] In truth, fishing in China takes many surprising forms.

FISH PRODUCTION

Figures of total production of fish and marine products for China are, as Morgan has said, little more than shrewd guesses.[19] Most figures dealing with Chinese fish production are estimated rather than actual

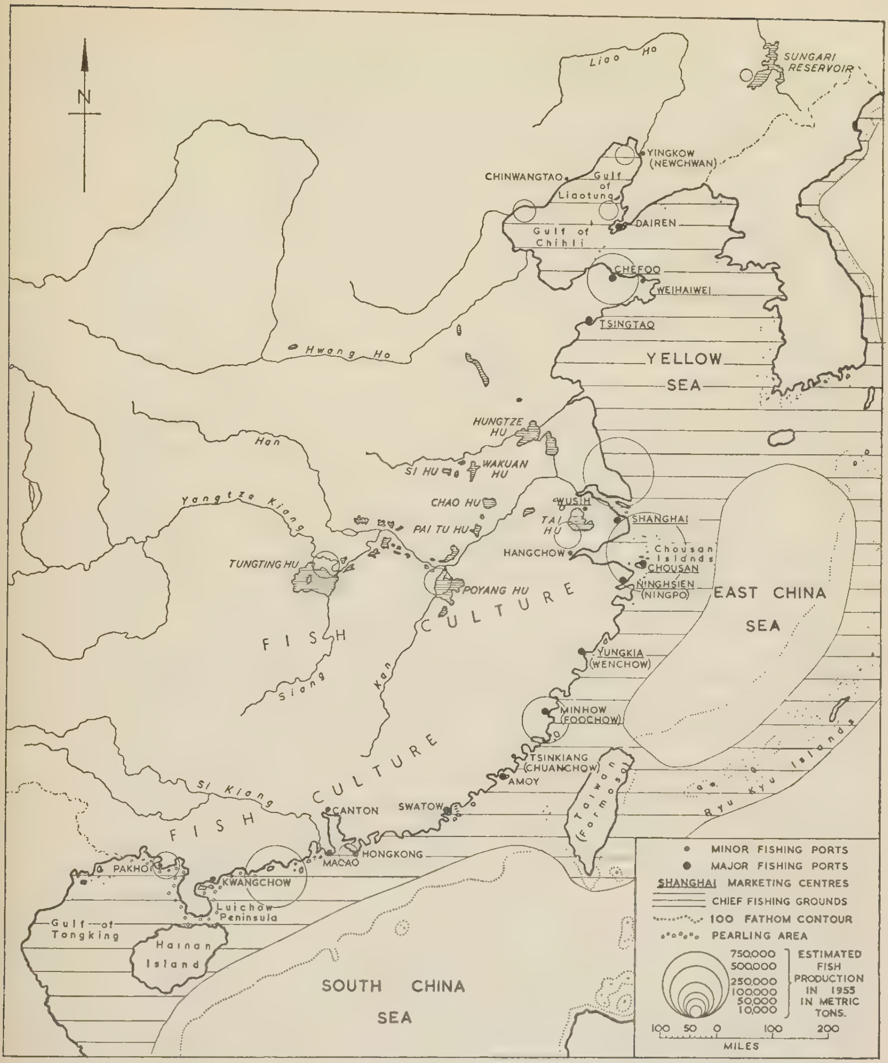

Fig. 1.—The fisheries of China. Based in part upon the *Oxford Economic Atlas* and Hermann's *Historical and Commercial Atlas of China.*

figures. The difficulty of securing exact totals or percentages can be easily appreciated in the case of China where official enumeration has always been lacking through inadequate administrative machinery. As a result of the absence of any organization for checking catches, the decentralized nature of the industry, its small-scale character and the untallied catches of innumerable coastal and inland fishing villages, it is inevitable that precise figures are unobtainable.

Pre-Sino-Japanese War estimates put the average total annual Chinese production of marine products at 700,000 metric tons; this figure, however, may well have been an underestimation. As a result of the war this figure declined sharply. In 1947 it was estimated that the weight of fish landed in China was 260,000 metric tons; this figure referred only to salt-water catches. Figures of fresh-water landings, though undoubtedly substantial, are not available. It is fairly safe to assume that in 1947 Chinese landings reached a grand total of approximately 500,000 metric tons.

The target set by the People's Government in 1951 was 500,000 metric tons, and in 1952 700,000 metric tons. These figures refer to salt-water catches. Recent estimates place the total annual catch at between 2 and 3 million metric tons: the Food and Agricultural Organization gives an estimate of 2,500,000 metric tons for the period 1948–9[20] and 3,000,000 metric tons for 1953, while the *Oxford Economic Atlas of the World* gives the average annual production for the period 1948–50 at 2,750,000 metric tons.[21] In view of the targets set by the Chinese Government during recent years and even allowing for fresh-water landings to equal salt-water catches, such figures would seem to be on the generous side. However, in view of the great efforts made during the last few years to re-equip and expand the industry, it is conceivable that such figures might fairly accurately represent present-day (1956) landings. If a figure of 2 to 3 million metric tons be accepted it means that China accounts for some 10 per cent. of the total world production of fish and has an output comparable with that of Japan, the United States and the Soviet Union, the world's major producers. China's imports and exports of fish are small: the average annual imports are around 5,000 metric tons, the exports 6,000.

THE ORGANIZATION OF THE INDUSTRY

The fact that the fishing was in a parlous state and that the present régime believes in state control, has resulted in the organization of the Chinese sea-fishing industry. Government intervention in the industry has taken five main forms.[22] Firstly, assistance has been given to the industry in the form of cash loans (£3·5 million to the fishermen's producer co-operatives and £1·4 million to the fishermen who operate individually, between 1947–51) for the purchase of boats, tackle, salt, etc. Secondly, fish markets have been established at the more important fishing centres, at Chefoo, Tsingtao, Shanghai, Chousan, Ninghsien, Wusih and Yungkia. In addition, the Government has established Marine Products Corporations in Shantung and Shanghai and Marine Products Marketing Corporations in Shantung, Anhwei and Chekiang to advise and help in the problems of production and marketing. Thirdly, the Government has assisted the sale and distribution of fish by placing orders for marine products, by lowering freight charges for carriage, by making salt available at low cost and by facilitating fish curing and storage. Fourthly, efforts have been made to make fishing safer: port facilities, lighthouses, buoys, etc., are being repaired or provided; the use of explosives has been banned; and the coasts are being cleared of the perennial menace of pirates. Sixthly, a special organization has been set up by the East China Committee on Marine Production to compile data appertaining to types and amounts of fish landed and to engage in research into the industry.

It is apparent that the industry, formerly unorganized, decentralized and unscientific, is being unified, centralized and modernized. Some indication of the developments taking place in the industry, apart from the increases in working craft, fish landed and volume of business, is given by the fact that, by 1952, eight cold storage plants, two cod-liver oil refineries, one cannery, two fish-net factories and two dockyards were serving the east China coast fisheries.[23]

FUTURE DEVELOPMENTS

What of the future? Development is linked fundamentally with the problems of production and marketing. Hitherto, output per fisherman has been low because of primitive and inefficient methods of fishing. The industry has had few modern vessels, depending upon the sailing junk in the main. Output has been limited, therefore, by inadequate technical equipment. In a country like China, however, which is industrially backward and has a large population, modernization presents a problem for two reasons: firstly, it is not easy, lacking capital and industrial resources, to provide modern fishing vessels costing up to £250,000 apiece, and, secondly, because the abundance and cheapness of labour reduces significantly the incentive to introduce up-to-date techniques. On the other hand, China is exploiting the adjacent seas considerably below optimum intensity; thus even modest improvements in her technical equipment should produce greatly increased returns.[24]

Marketing also presents difficulties. Daily and seasonal supplies of fish are characteristically variable and fish is a very perishable commodity. These two facts imply two needs: facilities for the speedy distribution of fresh fish and facilities for the preserving of surplus fish either by salting, freezing, drying, smoking or canning. Communications in China at present are such that, with a few exceptions, it is impossible to carry fresh fish over any distance so that many areas are denied fresh fish; moreover, the preserving and processing of fish, though long carried out by traditional methods, needs to be undertaken on a larger scale and the Government, alive to this need, is already making heavy investments in preserving and processing plants.

It is abundantly clear that there is much scope for the development of an even greater fishing industry and that China offers a vast potential market which will become realized as the standard of living rises and transportation facilities are improved.

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Early Maps and Local Studies

AUDREY M. LAMBERT

Without an historical approach to local geography a valid appraisal of the landscape is difficult, if not impossible. But the data for past periods are hard to come by and even when available are so often only in the most general terms. Printed books on topography and local history become increasingly numerous after the sixteenth century but they vary greatly in value and the information they supply is of slight worth until it can be located on the map and its space relations shown. Observation in the field may be helpful but even prolonged reconnaissance sometimes yields no result. Early maps here prove their worth, especially when used in conjunction with manuscript and other contemporary documents. First, however, their accuracy must be established and their limitations appreciated before any conclusions are based on the distributions they reveal. This paper suggests where early maps may be found, notes the principal types of map available and examines some of the ways in which detail on the map can be checked against other sources, discussing the various problems involved.

To ascertain what printed maps are available the most useful source is Chubb, *The Printed Maps in the Atlases of Great Britain and Ireland*[1] (found in most good reference libraries). This provides a chronological list of British atlases since 1579 and of the county maps in them, but gives no indication of the details they shew. An older but still very useful work is Gough's *British Topography.*[2] Some bibliographies on British and county topography also contain references to maps.[3] Handlists of printed maps and of manuscript maps and plans have been issued by some county record offices; other lists may be found in the publications of local history, record and archaeological societies, while catalogues issued for exhibitions organized by the National Register of Archives, local education committees or county record offices often contain references to maps.[4] In addition, writers such as Sir Herbert G. Fordham and Edward Lynam have made valuable studies of maps and map-makers, and many books on the history of cartography mention examples and include useful references.[5] Reproductions of the more famous maps have been published by various bodies and can be used when the originals are not easily accessible.[6]

Most counties now possess excellent collections of local maps in their record or archive offices to which the public can refer but there are numerous other possible sources. The student of local geography has a most useful function to perform in tracking down previously

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unrecorded material (especially manuscript plans) in the parish chest in local libraries or museums, or in the hands of private individuals or businesses.[7] Sales of private libraries occasionally bring maps into the second-hand bookshops. Plans of estates owned by the church or by the colleges of the older universities are to be found in diocesan records or in college and university libraries. The great national and provincial collections such as those of the British Museum, Public Record Office, the Bodleian (Oxford), John Rylands (Manchester) and Birmingham Reference Libraries as well as the National Libraries of Scotland and Wales also have large numbers of early local maps which can be consulted by *bona fide* workers.

For local studies, maps on a scale of at least one inch to a mile are desirable, covering areas ranging from a whole county down to a single parish, private estate or even smaller tract. Early maps fall into two main categories: official maps, produced by the Ordnance Survey or required by Act of Parliament, and a wide variety of unofficial publications.

The first Ordnance Survey map appeared in 1801. Thereafter sheets of various scales and editions were produced and comparison of successive issues can usefully illustrate the changes in town and country through the nineteenth century down to the present day. The first edition one-inch Ordnance Survey sheets provide a picture of this country in the first half of the nineteenth century, showing the woods, heaths, parks, common fields, turnpikes, industrial establishments, etc., but the unpublished preliminary drawings for this map are fully as important for they were made on scales of two, three or six inches to the mile and often ante-date the published maps by as much as ten or twenty years. Photostat copies of these drawings are to be seen at the British Museum. Also in the Museum are the 'area books' accompanying the first twenty-five inch plans. These give the 'state of cultivation' for the period *c.* 1865, but the recording of this data was dropped after a short time on grounds of economy and is thus available only for a portion of the country.[8]

Of the many maps statutorily required three types are especially useful to geographers: those accompanying enclosure awards, those prepared for the Tithe Redemption Commissioners and the maps and plans for public utilities (chiefly railways and canals).

From about 1760 onwards, the normal method of enclosing common lands was by private Act of Parliament. The Act authorized the appointment of commissioners to survey the lands to be enclosed. A large-scale plan of the survey was prepared and an award drawn up embodying the decision of the commissioners. These awards, with their plans, are invaluable sources of information. They record land ownership, the types of tenure, the width and course of roads and trackways and sometimes distinguish the types of land use; occasionally the pre-enclosure pattern of open-field farming is shown. Copies of the maps and awards were deposited in each parish, usually in the parish chest. They may subsequently have been collected into the county records office. Enclosures prior to 1760, generally made by private agreement, were often enrolled in chancery and reference must normally be made to the Public Record Office to find if they were accompanied by maps.

The tithe maps, produced as a result of an Act passed in 1836,[9] give much information on land use. A large-scale plan shewed each individual tithable plot, numbered to correspond with entries in a register which stated the ownership and occupation of the land, the tithe payable and to whom, and the current land use.[10]

Tithe and enclosure maps usually covered an entire parish or township; those, on the other hand, which the projectors of new canal or railway schemes were required to deposit referred normally only to limited areas along the line of the proposed railway or canal. One copy of the plan ultimately went to the House of Lords library, but few of these maps survived the fire which destroyed the Houses of Parliament in 1834; each landowner received a plan of that part of his estate which was affected by the project but many of these have been lost and are always difficult to trace; another copy of the plan was deposited with the Clerk of the Peace and it is these copies that are most readily accessible to research workers. In addition to the precise course of the railway or canal such maps may sometimes shew details of land use, tenure, etc. Many maps and plans of this sort are to be found among the records of the British Transport Commission and of the Ministry of Transport and Civil Aviation. They are stored in various repositories according to age and written permission must be sought from headquarters before access to them will be granted. Railway and canal companies frequently made surveys for projects which never materialized and the maps for these may be of great interest. Reference to books on canal or railway history may disclose whether any such material is likely to be found.[11]

The range of unofficial maps available is wide. Individual maps of Britain as a whole are generally on too small a scale to be of much use, although they may illustrate the differing relative importance of settlements in the past.[12] Nor do the early sets of county maps published in the late sixteenth and early seventeenth centuries by Christopher Saxton, John Norden and John Speed give much detail. An attempt is made to indicate relief; the larger forests, woods and parks are shown, and some, but not all, bridges (a guide to the main lines of movement). Roads are not marked. Speed's maps also demarcate the hundreds and are sometimes accompanied by topographical accounts listing, among other things, the local commodities of trade. Such maps are mainly valuable for suggesting lines of further enquiry, rather than for the information they themselves supply.

Published towards the end of the seventeenth century, John Ogilby's *Traveller's Guides* and, later, Emanuel Bowen's *Britannia Depicta: or Ogilby Improv'd*, with other books of this type, provide more detail. Designed for the traveller, Ogilby's maps are mere strips along the highways (mainly between London and the provinces), marking the prominent and easily recognizable features of the landscape—'a stone bridge,' 'arrable,' 'a Moore with a great many Colepitts,' 'Led furnace,' etc.—and distinguishing between the tracts of open fields and enclosures. Not all districts were traversed by main roads. Bowen's pocket-books have the added advantage of including accounts of the shires though the maps of the latter are very small. Plagiarism was unfortunately common among seventeenth and eighteenth century topographers. County descriptions were copied verbatim from much earlier works and cannot, therefore, be accepted without verification of the period to which they refer.

During the eighteenth century maps were being made for enclosures and for private estates where the "new husbandry" was being introduced; county surveys appear to have been an essential in the gentleman's library, while road-books and maps were increasingly in demand as the volume of traffic grew. Advances in surveying and in cartographic techniques enabled larger scales to be employed over greater areas, and finer drawing permitted more detail to be shewn. Large-scale plans for earlier periods may occasionally be encountered but the local historian or geographer who finds one covering all the region in which he is interested is fortunate indeed. A fine example of such an early map is at Syon House where Moses Glover's parchment *Plan of the Manor of Isleworth Syon* dated 1635 shews the land use on a scale of approximately 1 : 3,300 (*c.* nineteen inches to the mile). Another beautiful specimen of the cartographer's art is the pre-enclosure map of Atherstone in Warwickshire dated 1716.[13] Where such maps depict the individual strips in the open fields it is sometimes possible to check their accuracy by comparison with the ridges and furrows surviving in the fields to-day, the pattern of which is often most clearly distinguishable in aerial photographs.[14]

Many large-scale maps produced during the eighteenth and early nineteenth centuries shew parks, commons and heaths, woods and forests, bridges, windmills and industrial establishments of various kinds, but those of greatest interest to geographers are the comparatively rare examples distinguishing between different types of land utilization, as Jean Rocque's *Carte Topographique de la Comté de Middlesex*, 1754, and Andrew Dury and John Andrews's *Topographical Map of Hartfordshire*, 1766, both on a scale of two inches to a mile. Some maps were produced in response to offers of premiums or prizes made by the

Royal Society of Arts during the period 1759 to 1801.[15] One such award was made to Richard Davis of Lewknor in Oxfordshire, for a map on a scale of two inches to the mile, entitled *A New Map of the County of Oxford from an Actual Survey; on which are delineated: the Course of the Rivers and Roads, the Parks, Gentlemen's Seats, Heaths, Woods, Forests, Commons, etc., etc.* This map will be used hereafter in illustration of the methods by which the accuracy of such an unofficial or privately produced survey can be determined (with few exceptions the official maps are reliable sources).

A useful start can be made by discovering the opinion of contemporaries with local knowledge of the area portrayed, on the accuracy of the map. This information may be found in learned journals of the period, in the *Gentleman's Magazine*, or from correspondence and articles in the local press. For Davis's map the minutes of the Society of Arts's Committee of Polite Arts for March, 1797, record the reading of

> "a Certificate signed by many respectable Names of the Nobility and Gentry of Oxfordshire who certify that the Map before the Committee has been submitted to their Inspection and seems to them to be an accurate Survey.'[16]

The Committee nevertheless

> "Resolved that a Letter be written to Lord Charles Spencer and another to the Earl of Macclesfield desiring them to inform the Committee whether they signed the Certificate respecting the Map of Oxfordshire surveyed by Mr. Davis."

Their replies are subsequently noted in the minutes, the Earl stating that "He thinks the map exceedingly accurate" while Lord Charles observed that "every Body seems well satisfied."

One should next establish the precise date to which the map refers. For this purpose the publication date is unsatisfactory as several years may have elapsed since the actual survey. Davis's map was issued in sixteen sheets on 1st August 1797, but a small-scale map published at the same time refers to an "Actual Survey in 16 Sheets made in the Years 1793 and 1794." Where such explicit information is lacking, a comparison of the open-field areas, turnpike roads, buildings, bridges, etc., shown on the map with other documents relating to those features may reveal the period within which it could have been surveyed.

Further help in assessing the reliability of a map is given by a knowledge of the map-maker's qualifications and of other maps he has produced. The *Dictionary of National Biography*, contemporary local directories[17] and modern lists of maps (enclosure and other) may prove useful here, while parish registers, churchwardens' accounts and electoral rolls of the area in which he lived and worked may state his profession.

Richard Davis, for example, was a land-agent and surveyor and is known to have served on sixteen occasions as an enclosure commissioner within the county.[18] He was also author of the preliminary report on Oxfordshire for the Board of Agriculture and "a practical farmer on a small scale."[19] One would therefore expect him to be a competent observer of land use. He held, in addition the post of *Topographer to His Majesty* which he retained for the twenty years 1794 to 1813.[20]

The draughtsmanship of the map must also be examined. This may vary from a crude manuscript plan of a single estate[21] to the finely finished work of a well-known engraver. Davis's survey was issued by the noted geographical publisher John Cary, of the Strand, London. The latter was named also as the engraver but the sixteen sheets, though consistently of excellent draughtsmanship, reveal trifling differences which suggest that they are not the work of a single hand. The variations are, however, not significant enough to vitiate the accuracy or the artistic unity of the map.

The data on the map should now be subjected to critical examination. The relatively large scale needed in maps for local studies enables considerable detail to be shewn. Plate I provides examples of the symbols used on Davis's map; the differentiation between arable (faint broken lines) and pasture (a grass symbol) and between open fields and enclosures (by means of a conventionalized hedge-line) is of great value to the geographer. Where such detail is given it is possible to re-map much of the data on modern Ordnance Survey sheets for comparison with other sources such as Enclosure Acts and Awards and their plans and with estate books and plans and tithe maps. Where acreages are given the area on the map can be further checked by planimeter measurement. If documentary confirmation is lacking, land use should always be considered in relation to soils, relief and drainage, and any obvious anomalies investigated. An example from Davis's map illustrates the value of this approach. An extensive tract of grassland, in an otherwise arable area of uniform physical character, was found to reflect the unsuccessful attempts of a landowner to overcome his financial difficulties (due largely to speculation and gambling) by agricultural experimentation. Every possible means should be used in checking early maps since it may bring to light unsuspected deficiencies. Thus, even if comparison with other documents substantially confirms the information relating to arable and pasture (both open-field and enclosed) it is still necessary to check the extent of the woods, forests and heaths with as many other sources as possible.

The usefulness of early maps is not restricted to land-use data. They provide also valuable material for the study of settlement. The form of towns and villages and the location of isolated farmsteads, barns, kilns, water- and wind-mills may be shown. Many late

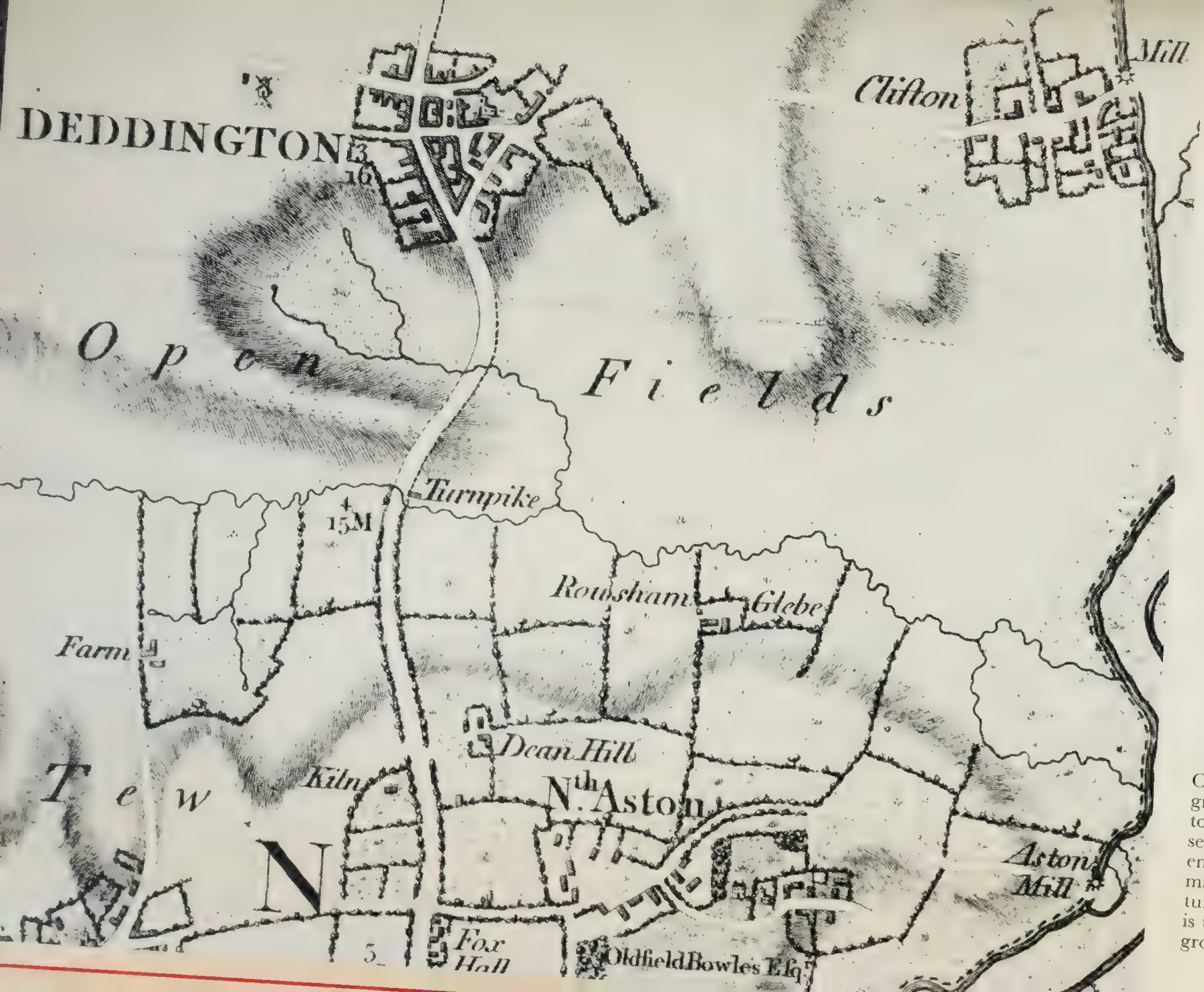

Plate I.—A section of Richard Davis's map of Oxfordshire showing the symbols used. Arable, grass- and wood-land can be distinguished, together with the yards and gardens about the settlements. The hedge symbol differentiating enclosures from the open fields is clearly seen. Also marked are a church, kiln, water- and wind-mills, turnpike, milestones, river and canal. Hill-shading is used in an attempt to bring out the form of the ground.

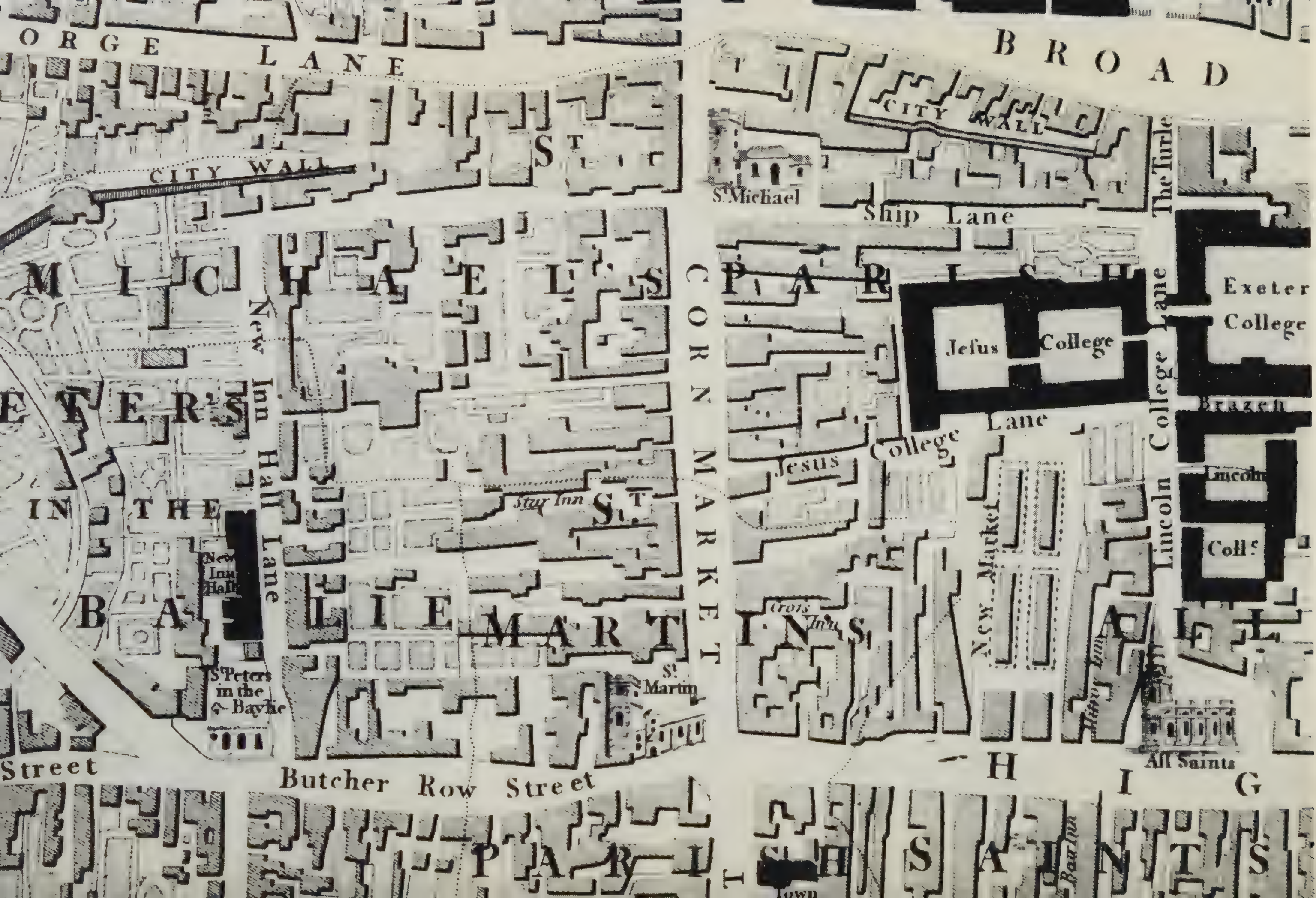

Plate II.—A section of the inset *Plan of the University and City of Oxford* on Davis's map showing the considerable amount of detail it contains.

eighteenth century maps provide a good picture of the settlement distribution in the years prior to the first census of 1801. The rapid growth in population and improvements in communications which marked the later phases of the industrial revolution had, as yet, hardly affected the countryside. Indeed, in some counties, the pattern of settlement in existence at the time of Domesday Book had still been only slightly modified by post-Norman colonization of the waste and the disappearance of some villages in the later medieval period.[22]

For the student interested primarily in the development of urban areas many maps exist of the larger or more ancient cities and towns. Early maps comparable with Ralph Agas's maps of London (*c.* 1591), Oxford (1578), Cambridge (1592) and Dunwich, and William Smith's plan of Bristol (1568) are rare, but seventeenth century interest in antiquities led to the production of books such as David Loggan's *Cantabrigia Illustrata* (1690) and *Oxonia Illustrata* (1675), and in the eighteenth century maps such as J. Chadwick's *Mapp of all the Streets & Alleys within the Town of Liverpool* (1725), and William Westley's *Plan* and *East Prospect of Birmingham* (both *c.* 1731) were being issued in growing volume. County maps were often embellished with views and plans of their principal towns as in Thomas Jeffreys's *The County of York Survey'd* (1771–2), which contains plans of York, Sheffield, Leeds, Ripon, Scarborough and Hull on a scale of six chains to the inch. Davis's map includes a *Plan of the University and City of Oxford* on a scale of three chains to the inch, a section of which is reproduced in Plate II, revealing the detail sometimes given in these maps. When studied in conjunction with contemporary guidebooks, directories and coach time-tables such plans can help to re-create the atmosphere of social, commercial and industrial activity in the past, as well as illustrate the development and growth of urban areas.

Comparison of early maps with each other and with the modern map may disclose radical changes in the direction of flow of traffic, the origin of present-day footpaths as cart-ways through the open fields, as well as changes in the alignment of the main highways. Reference to Enclosure, Tithe and the first Ordnance Survey sheets and to descriptions in guides, itineraries, Turnpike Acts and the records of Quarter Sessions highways presentments and of Turnpike Trustees, can confirm and supplement this information. The map itself may, for the convenience of travellers, also locate the toll-bars, bridges, fords, ferries, milestones and the principal inns. Waterways formed an important means of communication in the pre-railway age and many maps show, in addition to the courses of the rivers and canals, the sites of wharves, locks, weirs and other obstructions to navigation, and water-mills (sometimes indicating whether the latter were corn, paper or fulling mills).

Over and above the material relating to land use, settlement and communications, early maps present a body of miscellaneous data the value of which depends largely on the needs of the individual research worker. Places mentioned in old documents but since vanished from the landscape may be traced; the spelling of place-names gives a clue to their pronunciation and thus to their original meaning,[23] prehistoric remains, all surface evidence of which has been destroyed, may be marked, while by giving the names of owners or tenants beside the larger country seats a clue may be provided to further sources of material listed by the Historical Manuscripts Commission or filed in local record offices under their former owner's name.

No paper can make a complete list of all the methods of establishing the accuracy of early maps, nor can those here described be applied indiscriminately, while it has been possible to mention only a few examples of the many types of map. Each requires individual treatment. The techniques outlined above should ensure that the fullest amount of information is gained from such study.

NOTES AND REFERENCES

N.B.—These footnotes are a guide to the *types* of material available for checking the information supplied by early maps. They do not form a *complete* list of all such sources. Readers are reminded of the inter-library loan service in British public libraries through which books, etc., including the published proceedings of archaeological, natural history, and other societies, can generally be borrowed if they are not locally obtainable.

[1] Thomas Chubb, *The Printed Maps in the Atlases of Great Britain and Ireland*, London, 1927. A bibliography covering the period 1579–1870 with biographical notes on the map-makers, engravers and publishers.

[2] Richard Gough, *British Topography, or, an historical account of what has been done for illustrating the topographical antiquities of Great Britain and Ireland*, 2 vols., London, 1780. Mentions maps *passim*.

[3] Among such bibliographies the following deserve mention:

John P. Anderson, *The Book of British Topography*, London, 1881. A classified catalogue of the topographical works in the library of the British Museum relating to Great Britain and Ireland. Includes references to maps.

Arthur L. Humphreys, *A Handbook to County Bibliography, being a Bibliography of Bibliographies relating to the Counties and Towns of Great Britain and Ireland*, London, 1917. Has some references to maps.

Sir Arthur Mitchell and C. G. Cash, "A Contribution to the Bibliography of Scottish Topography," *Scottish Historical Society Publication*, Second series, vols. xiv and xv, Edinburgh, 1917. Maps referred to in vol. xv.

Samuel Woodward, *The Norfolk Topographer's Manual*, London, 1842. Revised and augmented by W. C. Ewing. Has brief notes on maps.

William Boyne, *The Yorkshire Library*, London, 1869. Section on maps.

E. Heawood, *English County Maps in the Collection of the Royal Geographical Society*, London, 1932.

R. J. Lee, "English County Maps: the identification, cataloguing and care of a collection," *Library Association Pamphlet*, London, 1955.

[4] Roland Austin, *Additions to, and Notes on the "Descriptive Catalogue of Printed Maps of Gloucestershire* 1577–1911" *by T. Chubb*, Bristol, 1917. (Reprint from *Transactions of the Bristol and Gloucestershire Archaeological Society*, Bristol, 1917.)

Bedford County Records Committee, *A Catalogue of the Maps in the Bedfordshire County Muniments, etc.*, Bedford, 1930.

Bedford County Records Committee, *Catalogue of the Enclosure Awards, Supplementary Catalogue of Maps and List of Awards upon Tithe, in the Bedfordshire County Muniments*, Bedford, 1939.

Thomas Chubb, "A Descriptive Catalogue of the Printed Maps of Wiltshire from 1576 to the publication of the 25 in. Ordnance Survey, 1885," *Wiltshire Archaeological and Natural History Magazine*, vol. xxxvii, No. 116, Devizes, 1911.

Thomas Chubb, "A Descriptive Catalogue of the Printed Maps of Gloucestershire, 1577–1911," *Transactions of the Bristol and Gloucestershire Archaeological Society*, vol. xxxv, pt. 2, Bristol, 1913.

Thomas Chubb, "A Descriptive List of the Printed Maps of Somersetshire, 1575–1914," *Somerset Archaeological and Natural History Society*, Taunton, 1914.

Thomas Chubb, *A Descriptive List of the Printed Maps of Norfolk*, 1575–1916, Norwich, 1928.

John F. Curwen, "The Chorography, or a Descriptive Catalogue of the Printed Maps of Cumberland and Westmorland," *Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society*, New Series, vol. xviii, Kendal, 1918.

F. G. Emmison, *Catalogue of Maps in the Essex Record Office*, 1566–1855, Essex Record Office Publication, No. 3, Chelmsford, 1947. Describes over 1,000 maps with numerous illustrations, some in full colour.

F. G. Emmison, *Supplement to the Catalogue of Maps in the Essex Record Office*, Essex Record Office Publication, No. 16, Chelmsford, 1952.

Sir Herbert G. Fordham, *Hertfordshire Maps: A Descriptive Catalogue of the Maps of the County*, . . . 1579–1900, Hertford, 1907. (Reprinted from the *Transactions of the Hertfordshire Natural History Society and Field Club*, Watford, 1902–7.)

Sir Herbert G. Fordham, "Supplement to the Hertfordshire Maps," *Transactions of the Hertfordshire Natural History Society and Field Club*, Watford, 1914.

Sir Herbert G. Fordham, *Cambridgeshire Maps: A Descriptive Catalogue of the Maps of the County and of the Great Level of the Fens*, 1579–1900, Cambridge, 1908. (Reprinted from the *Cambridge Antiquarian Society Communications*, vols. xi and xii, Cambridge, 1904–8.)

William Harrison, "Early Maps of Lancashire and their Makers," *Transactions of the Lancashire and Cheshire Antiquarian Society*, vol. xxv, Manchester, 1907.

William Harrison, "Early Maps of Cheshire," *Transactions of the Lancashire and Cheshire Antiquarian Society*, vol. xxvi, Manchester, 1908.

(Harrison's work has now been largely superseded by that of Harold Whitaker, which see.)

National Register of Archives in conjunction with the Twickenham Borough Council, *Exhibition Catalogue*, 1950, duplicated typescript foreword by W. Le Hardy.

National Register of Archives in conjunction with the Ruislip-Northwood Urban District Council, *Exhibition Catalogue*, 1953, duplicated typescript, foreword by W. Le Hardy.

Northamptonshire County Council, *The County of Northampton and County Council Handbook for 1955-6*, Northampton, 1955, contains (pp. 262–5) a list of enclosure awards, stating whether they are accompanied by a map.

Francis W. Steer and F. Hull, *Illustrated Handbook to Exhibition of Essex Estate, County and Official Maps*, Chelmsford, 1947.

Peter Walne, *A Catalogue of Inclosure Maps in the Berkshire Record Office*, Reading, 1955. (Reprint from the *Berkshire Archaeological Journal*, vol. liv, Reading, 1954–5.) Gives an indication of the area covered by each map and notes traces of pre-enclosure pattern of land-holding.

Harold Whitaker, "A Descriptive List of the Printed Maps of Yorkshire and its Ridings, 1577–1900," *Yorkshire Archaeological Society Record Series*, vol. lxxxvi, Leeds, 1933.

Harold Whitaker, "A Descriptive List of the Printed Maps of Lancashire, 1577–1900," *Chetham Society; Remains, Historical and Literary, connected with the Palatine Counties of Lancaster and Chester*, New Series, vol. ci, Manchester, 1938.

Harold Whitaker, "A Descriptive List of the Printed Maps of Cheshire, 1577–1900," *Chetham Society; Remains, Historical and Literary, connected with the Palatine Counties of Lancaster and Chester*, New Series, vol. cvi, Manchester, 1942.

Harold Whitaker, "A Descriptive List of the Printed Maps of Northamptonshire, 1576–1900," *Northamptonshire Record Society Publications*, vol. xiv (dated 1947), Northampton, 1948.

Harold Whitaker, "A Descriptive List of the Maps of Northumberland, 1576–1900," *Newcastle-upon-Tyne Society of Antiquaries*, Newcastle-upon-Tyne, 1949.

There are also numerous publications not issued under the auspices of any local government office or local society such as:

Frederick Crace, *A Catalogue of Maps, Plans, and Views of London, Westminster & Southwark*, London, 1878.

George A. Stephen, *A Descriptive List of Norwich Plans and the Principal Early Views, 1514–1914*, Norwich, 1928.

[5] Sir Herbert G. Fordham, *Studies in Carto-Bibliography British and French and in the Bibliography of Itineraries and Road-Books*, Oxford, 1914.

Sir Herbert G. Fordham, *The Road-Books and Itineraries of Great Britain 1570 to 1850*, Cambridge, 1924.

Sir Herbert G. Fordham, *John Cary: Engraver, Map, Chart and Print-Seller and Globe-Maker 1754 to 1835*, Cambridge, 1925.

Sir Herbert G. Fordham, '*Paterson's Roads*': *Daniel Paterson his Maps and Itineraries, 1738–1825*, London, 1925.

Sir Herbert G. Fordham, *Hand-List of Catalogues and Works of Reference relating to Carto-Bibliography and Kindred Subjects for Great Britain and Ireland 1720 to 1927*, Cambridge, 1928.

Sir Herbert G. Fordham, *Some Notable Surveyors & Map-Makers of the Sixteenth, Seventeenth & Eighteenth Centuries and their Work*, Cambridge, 1929.

H. R. G. Inglis, and others, *The Early Maps of Scotland*, second edition, Edinburgh, 1936.

Edward W. O. Lynam, *British Maps and Mapmakers*, London, 1944.

Edward W. O. Lynam, "English Maps and Map-makers of the 16th century," *Geographical Journal*, vol. cxvi, London, 1950.

Edward W. O. Lynam, *The Mapmaker's Art*, London, 1953.

F. J. North, *The Map of Wales before 1600 A.D.*, Cardiff, 1935.

R. A. Skelton, *Decorative Printed Maps of the Fifteenth to Eighteenth Centuries*, London, 1952.

R. V. Tooley, *Maps and Mapmakers*, second edition revised, London, 1952. Contains excellent summary lists of editions of early atlases and of English county maps.

John Varley, "John Rocque. Engraver, Surveyor, Cartographer and Map-Seller," *Imago Mundi*, vol. v, Stockholm, 1948. Includes valuable list of his works.

Harold Whitaker, *The Harold Whitaker Collection of County Atlases, Road-Books & Maps presented to the University of Leeds*, Brotherton Collection, Leeds, 1947.

[6] John Arlott (editor), *John Speed's England: a coloured facsimile of the first edition (1611)*, 4 vols., London, 1953.

E. G. R. Taylor, *John Speed's Atlas of England and Wales*, London, 1951, a Penguin book.

The Maps of Christopher Saxton engraved 1574–1579, London, 1939, published by order of Trustees of the British Museum, introduction by E. W. O. Lynam.

[7] Although not intended as guides to "likely places to find maps" the works named below give an indication of the wide range of possible sources of this type of document.

F. G. Emmison and I. Gray, *County Records*, London, 1948. An introduction to the sources of county records.

R. B. Pugh, *How to write a Parish History*, sixth edition, London, 1954. Historical Association Special Series.

W. E. Tate, *The Parish Chest. A Study of the records of parochial administration in England*, second edition revised and enlarged, Cambridge, 1951.

Any hitherto unrecorded manuscript maps which may be discovered should be reported to the National Register of Archives, Malet Place, London, W.C.1, or to the relevant County Record Office, to ensure their preservation.

[8] The areas for which this information is available are the south-eastern counties, Northumberland, Durham, Westmorland, parts of Derbyshire, Glamorgan, the Isle of Wight and the south-west peninsula, with scattered tracts in the midlands and elsewhere. I am indebted to Mr. J. T. Coppock, M.A., University College, London, for this information.

[9] 6 and 7 William IV, c. 71. Public General. 1836. An Act for the Commutation of Tithes in England and Wales.

For examples of the use of tithe data see:

L. Dudley Stamp, *The Land of Britain, its use and misuse*, London, 1948, pp. 55–8, and the county reports of the *Land Utilisation Survey*.

[10] The maps and registers are available for inspection at:

The Tithe Redemption Commission, 33, Finsbury Square, London, E.C.2.

Intending visitors must give notice of their visits specifying the parish maps they wish to see.

[11] For example, books such as:

Sir William M. Acworth, *The Railways of Scotland: their present position*, London, 1890.

Sir William M. Acworth, *The Railways of England*, London, 1899.

Henry R. de Salis, *A Chronology of Inland Navigation in Great Britain*, London, 1897.

Henry G. Lewin, *Early British Railways: a short history of their origin and development, 1801–1844*, London, 1925.

Henry G. Lewin, *The Railway Mania and its aftermath, 1845–1852: being a sequel to Early British Railways*, London, 1936.

Edward T. MacDermot, *History of the Great Western Railway*, 2 vols., London, 1927 and 1931.

J. Phillips, *A General History of Inland Navigation*, London, 1795.

J. Priestley, *Account of the . . . rivers, canals and waterways of Great Britain*, London, 1831.

George A. Sekon (pseudonym of G. A. Nokes), *The London and South-Western Railway*, London, 1896.

George A. Sekon, *The Great Northern Railway*, London (?), 1903.

Wilfred L. Steel, *The History of the London and North Western Railway*, London, 1914.

Clement E. Stretton, *The History of the Midland Railway*, London, 1901. (Author also of many other works on railway history.)

[12] For example the Matthew Paris and Gough maps of Britain (thirteenth and fourteenth centuries respectively). See:

J. B. Mitchell, R. A. Pelham, and E. Heawood, "Early Maps of Great Britain," *Geographical Journal*, vol. lxxxi, London, 1933.

[13] Robert Hewin, *A Plan of Atherston Feildes. Parcell of the Estate of Abraham Bracebridge, Gent. in the County of Warwick. Taken in the yeare 1716. Scale of 32′ in an inch.* Now in the County Record Office, Warwick.

[14] The techniques employed are illustrated by the examples quoted in the works of:

Maurice W. Beresford, "Ridge and Furrow and the Open Fields," *Economic History Review*, Second series, vol. i, No. 1, London, 1948.

Maurice W. Beresford, "Maps and the Medieval Landscape," *Antiquity*, vol. xxiv, Gloucester, 1950.

For an opposing view on the significance of ridge and furrow see:

Eric Kerridge, "Ridge and Furrow and Agrarian History," *Economic History Review* Second series, vol. iv, No. 1, London, 1951.

[15] Sir Henry T. Wood, *A History of the Royal Society of Arts*, London, 1913, pp. 298–300.

[16] The Librarian of the Royal Society of Arts kindly permitted the inspection of the minute books from which this and subsequent quotations have been taken.

[17] Among the many local directories which may be of use are:

P. Barfoot and J. Wilkes, *The Universal British Directory of Trade, Commerce, and Manufacture*, 5 vols., London, 1791.

J. Pigot, *Pigot and Co's National Commercial Directory*, London, several editions 1828–34.

[18] W. E. Tate, "Oxfordshire Enclosure Commissioners, 1737–1856," *Journal of Modern History*, vol. xxiii, Chicago, 1951.

[19] Richard Davis, *A General View of the Agriculture of the County of Oxford etc.*, London, 1797, p. 33.

[20] J. Debrett, *The Royal Kalendar: or, complete and correct annual register for England, Scotland, Ireland, and America*, London, 1793–1814.

[21] D. J. Price, "Medieval Land Surveying and Topographical Maps," *Geographical Journal*, vol. cxxi, London, 1955, cites examples of medieval manuscript plans.

[22] On methods of identifying lost medieval settlements see:

M. W. Beresford, *The Lost Villages of England*, London, 1954. Chaps. 7 and 10 give details of known 'lost villages.'

M. W. Beresford, "The Lost Villages of Medieval England," *Geographical Journal*, vol. cxvii, London, 1951.

Translations of Domesday Book, such as those in the volumes of the *Victoria County Histories*, enable an attempt to be made at the reconstruction of the settlement pattern immediately after the Norman conquest. See also:

H. C. Darby (editor), *The Domesday Geography of England*, Cambridge, the first two volumes of which, Eastern England and the Midlands, have already appeared.

[23] This is a task for the expert. The amateur should refer to the volumes of the *English Place-Name Society.*

Topographical Maps for use in the Classroom

R. T. COBB

ONE OF THE TRENDS IN GEOGRAPHY TEACHING at the present time is towards an increasing use of large-scale topographic maps in an effort to make the subject ever more real and alive to the pupils, of whatever age, ability or aptitude. This is encouraged by the emphasis placed upon school journeys, local studies and other forms of field work, and by the realization that a large-scale map can breathe life into certain aspects of geography which the generalizations of atlases have hitherto kept dead and only half-comprehended. With this realization has come the decline of lessons that "teach map-reading." More and more has map-reading become something which is introduced naturally and unselfconsciously into the lesson when certain aspects of geography are illustrated by specific instances which can be seen by all the pupils. However, the accumulation of a map collection is a long task, and one which, in Britain at least, offers a choice so great as to be almost overwhelming. Obviously, the ideal state of affairs would be to own a collection containing maps illustrating the outstanding characteristics of each of the main regions of Great Britain, but this is, for most schools, a very remote objective.

It is possible to buy map-extracts at quite low prices. The Ordnance Survey sells excess copies of extracts used in G.C.E. papers (usually at the scale one inch to one mile, some at 1/25,000) at 6d. per copy. Such extracts may be obtained from the Director General, Ordnance Survey, Leatherhead Road, Chessington, Surrey, and payment must accompany the order; information about the availability and coverage of the maps may be obtained in advance. Stocks of these extracts are very limited, however, and one cannot rely on an order being fulfilled. Moreover, the area covered by any map is quite small, although the maps have been selected as showing regions of considerable geographic variety. The Geographical Association has published sets of six Ordnance Survey map-extracts (scale one inch to one mile), including two showing relief and drainage only. These cost 4s. 6d. per set, and for a further 2s., geological transparencies may be obtained to accompany the map sets. Larger in size (15 × 12 inches) than the examination extracts, they can be of considerable assistance to teachers. Not all of the sheets have a National Grid overprint, however, and conventional signs and colours are alike rather dated—the latter being more obviously so than the former. The areas selected for these sets are

➤ Mr. Cobb is Geography Master at Woolverstone Hall, Woolverstone, Ipswich.

parts of the South Downs, of the Mid-Severn Valley, of the South Wales Valleys and of the Cairngorms. None of these map extracts, whatever its origin, is printed with a full key of conventional signs.

But, useful though these extracts are, the teacher will turn ultimately to the full sheets of the Ordnance Survey to meet the needs of his classes. The first point to be decided is the form in which the maps are to be purchased. Here, storage would appear to be a deciding factor, for if it is possible to store them properly, the paper-flat form is the cheapest—at the time of writing, 3s. for one-inch maps, less the educational rate discount.* The paper-flat form does not wear out as quickly as the folded type, which tends to become rubbed at the folds. The flat maps are rather cumbersome and awkward for children to handle and large classes in a restricted space can find them something of a nuisance.

The basis of any school map collection should be a large-scale map of the area surrounding the school. Knowledge of this map is the foundation upon which all future map-reading will be built, and for this it would seem that the "2½-inch" or 1 : 25,000 scale is best. In urban areas the 2½-inch maps show all streets and other prominent features; in rural districts they show detail down to field boundaries. The area covered is large enough to provide material for a number of excursions and exercises, whilst the smaller size of the sheet (usually 24 × 19 inches including margins) makes it much easier to handle out of doors than the one-inch map (usually 35 × 29 inches). On all counts it is of outstanding utility and importance to the teacher.

For beginning or adding to the small collection of one-inch maps which most schools are able to afford, a map should comply with the following requirements:

1. It should illustrate as many different aspects of geographical variety as possible, whether of structure, altitude, land use (if decipherable), human or economic importance.
2. It should contain certain readily discernible features typical of the region in which it lies, so that it may be used in a regional course as well as to show specific points.
3. It should show the simpler, elementary points clearly, and yet be useful for more detailed analysis at more advanced levels.

Below are the details of a number of map sheets which fulfil all or most of these requirements. The suggestions made are not meant to be exhaustive by any means—they merely represent certain maps which one teacher has found to be of considerable use in the classroom, and are offered to assist those who are beginning their map collections.†

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* Information about discount and appropriate requisition forms can be obtained from the Director General, Ordnance Survey, Leatherhead Road, Chessington, Surrey.

† The writer would like to acknowledge his indebtedness to the Department of Geography, University of Sheffield, in which he was introduced to several of the maps mentioned, in the course of advanced practical work.

Sheet 165—Weston-super-Mare (One-inch England and Wales, 6th Edition, coloured). Stretching from the southern part of Bristol as far south as Bridgwater, this sheet shows rapid variation between limestone, alluvium and sandstone, between nucleated and dispersed settlement patterns, very ancient and very new settlements, dry and well-drained upland areas, and poorly drained lowland—in fact it is a veritable mine of information. Moreover, it shows a considerable stretch of coastline, with ria and headland, submerged forest and wave-cut bench. There is something here for everyone, from the first form in the secondary school to the sixth.

Sheet 180—The Solent (One-inch England and Wales, 6th Edition, coloured). This sheet includes the whole of the Isle of Wight, as well as Portsmouth, Southampton and much of the New Forest on the mainland. Here again is a great variety of rocks, of settlement and of land use, with all which that implies, within a very small compass. Also, there is on this sheet an even greater variety of coastal phenomena—Hurst Castle and Calshot spits, the Needles, as well as a multiplicity of rias, cliffs and wave-cut benches. An important aid to the full use of this sheet is the special One-inch geological map of the Isle of Wight (price 7s.) which covers almost the same area.

Sheet 188—Torquay (One-inch England and Wales, 6th Edition, coloured). Here the variations in structure are not quite so marked and obvious, although the fringe of Dartmoor stands out clearly enough in the northwest. But the study of settlement and settlement types, of the incised valleys, of the routeways and communications and of the coastal phenomena can be pursued at length, whilst the construction of longitudinal river profiles and projected profiles offers interesting exercises at a more advanced level. Most of the area is covered by One-inch sheets of the Geological Survey (339—Teignmouth and 350—Torquay) but the structure is rather complex and could only be understood by older pupils.

Sheet 93—Scarborough (One-inch Great Britain, Seventh Series, coloured). Once again there is a juxtaposition of chalk and sandstone, uplands and ill-drained lowlands, combined with coastal phenomena, although less land area is shown than in the preceding maps, and there is not such a wealth of detail as on the Weston and Solent sheets. This map might be of more use in northern schools, however, as showing an area with which some of the pupils might be familiar. The structure is comparatively simple, and is well shown for part of the area on sheet 54 (Scarborough) of the One-inch Geological Survey.

Sheet 111—Buxton and Matlock (One-inch Great Britain, Seventh Series, coloured). The area covered by this sheet is of considerable interest as showing the "textbook" structure of the Pennines. The stream-ridden Kinder block contrasts markedly with the mass of limestone to the south, whilst to both east and west the prominent inward-facing scarps or edges denote the structure, and the Coal Measures are indicated by the presence of collieries on the eastern margin of the sheet. Different types of settlement and land use, both past and present, can be identified, whilst sufficient is shown of the city of Sheffield to enable some of the factors contributing to its growth to be made more clear.

The Wealden area. It might well be considered that this area, which has been one of the most intensively studied regions in Britain, as well as showing a great variety of geographical features should warrant a place in any school's map collection. A section across the Weald can be followed using sheets 170 and 182 or sheets 171 and 183 (all One-inch England and Wales, 6th Edition, coloured). But the writer's experience has been that, for schoolboys, these sheets are too full of information for them to be unravelled without an excessive amount of guidance. This is particularly true of the northern part, where London and its tentacles obscure much of the detail. More success has accompanied the use of *sheet 12, England, Southeast, and London,* on the scale of four miles to an inch (Quarter-inch Great Britain, Layered Edition). It is true that in this way much detail is lost, but the layer colouring emphasizes the relief sufficiently to enable conditions to be understood quite clearly. In addition, much of the London Basin is shown on the same map, and the relationship of the chalk lands of southeastern England can be readily appreciated. The sites and situations of most of the towns are shown in sufficient detail for general school use, but the drainage pattern is rather difficult to trace. As it is even more difficult on the One-inch map, this is not such a disadvantage as might first appear. The main criticism of the use of the Quarter-inch map appears to the writer to be that it over-simplifies conditions in the Weald, especially the structure of the area, although this may be corrected by the use of a sheet of the One-inch Geological Survey.

Glacial topography. Maps showing the features of a glaciated upland are necessarily specialized in that as a rule they show very little else in the way of physical features. Here, then, one searches for a sheet which shows the greatest variety of glacial features, shows them clearly and shows something of the human reaction to these conditions. Such a map is *sheet 107, Snowdon* (One-inch Great Britain, Seventh Series, coloured). There is a full range of phenomena associated with a glaciated upland, including a breached watershed; the "grain" of Anglesey is an obvious feature, directing attention to the lowland, whilst on the coast there is a perfect tombolo for good measure. There is also much human activity recorded—towns such as Conway with its castle, slate quarrying in the mountains, interesting communication patterns and, at Dolgarrog, an aluminium works.

For those who are more at home in the Lake District, it is worth noting that the layer-coloured Tourist edition of the One-inch map of this area is available in a post-war edition and, in the paper-flat form at least, costs no more than the Seventh Series sheets.

One further sheet deserves mention—*sheet 9, Cape Wrath* (One-inch Scotland, Popular Edition, coloured). This area contains a great variety of glacial phenomena, including sea locks and a lake-strewn, glacially scoured lowland. There is, however, an almost complete absence of features attributable to human activity.

More detailed information about Ordnance Survey maps, survey revisions, map editions, the National Grid and Reference system is available in three publications of that department:

A Description of the Ordnance Survey Large Scale Plans, 1954. 2s. (25-inch (1 : 2,500) and larger.)

A Description of Ordnance Survey Medium Scale Maps, 1955. 2s. 4d. (2½-inch (1 : 25,000) and 6-inch.)

A Description of Ordnance Survey Small Scale Maps, 1956. 2s. 4d. (One-inch and smaller scales.)

These booklets include, where possible, index sheets for maps on some scales (e.g. 1 : 25,000, One-inch and Quarter-inch scales) and a list of the names of official agents of the O.S. in England, Wales and Scotland where index sheets for all scales can be consulted. Extracts of maps on various scales are used as specimens to illustrate the booklets. Monthly publication reports are also available from the Ordnance Survey supplying information about the printing of sheets in new editions.

The full descriptions of the most commonly used maps are:

One-inch scale:

Great Britain, Seventh Series, coloured—the most recent edition at this scale, which is gradually superseding the *England and Wales, Sixth Edition* (*New Popular*), *coloured*, and the *Scotland, Popular Edition, coloured.*

2½-inch scale (1 : 25,000):

Great Britain, provisional edition, coloured. A few sheets have been published in the *Regular edition*, which supersedes the provisional.

6-inch scale:

Great Britain, County sheet lines—now being superseded by sheets, covering 5 kilometres square, quartering each 2½-inch sheet, described as *Great Britain, National Grid lines.*

Maps can be obtained in other special editions, in various scales, for instance outline edition, useful for field study groups, plotting of data, etc. and administrative areas edition. These are fully described for each scale in the O.S. booklets.

Sheets showing relief and drainage only in the scales of One-inch, 2½-inch and ¼-inch may be obtained on special order, only through the Geographical Association; there may often be some delay in the printing of these sheets. Details of this service will be supplied upon application to the headquarters of the Geographical Association provided a stamped addressed envelope is sent with the request.

Information about geological maps may be obtained from the Geological Survey, Geological Museum, Exhibition Road, South Kensington, London, S.W.7.

Geography in Institutes of Further Education

In 1953 the Further Education Section of the Geographical Association, having recently been formed, undertook as one of its first tasks to make a survey of the position of geography in the institutes of further education which it represents—Technical Colleges, Colleges of Commerce, etc. This report is the outcome of this preliminary survey and is based on sample information from a number of these institutes; for which reason it may not be regarded as complete. It provides a general picture of conditions over the country and a basis for a more comprehensive survey.

There are some 535 Institutes of Further Education in England, ranging in size from the small Local Institutes concerned principally with part-time and usually evening education to the large Technical Colleges which draw students from a wide area and which are concerned with a variety of studies up to degree standard. Of these 535 institutes, some 51 concern themselves with purely academic work, some 295 with, mainly, commercial training and 158 with general subjects; the rest are more specifically or purely and simply colleges of science and technology, e.g., colleges concerned with mining or metallurgy. There is a certain degree of overlapping here, but it may be said that there are opportunities for geographical work in about two-thirds of the Institutes of Further Education. The number of Colleges of Technology and Commerce, as distinct from Local Institutes (i.e. those concerned primarily with evening work) is around 200 and it is mainly in these that geography finds a place. This survey, it must be emphasized, has been concerned, therefore, with "colleges" not "schools" (e.g., Commercial Schools, Trade Schools, etc.).

Between 1954 and 1955 over 50 institutes were invited to supply information about the status of geography. Not all replied, but it would be unwise to assume absence of reply implied absence of geography. The response, however, was good (37 replies) and prompt and was indicative of the general interest shown in the enquiry. The institutes contacted differed considerably in size, ranging from the larger institutions with over 5,000 full-time and part-time students to the smaller with less than 2,000 students, the great majority of whom are part-time evening students.

The information sought was principally as follows: (1) is there a full-time appointment as lecturer in geography on the staff of the institute; (2) what are the academic qualifications of the lecturer; (3) is the lecturer a fully trained geographer; (4) are part-time teachers employed and if so are they trained geographers; (5) to what standard is geography taught (e.g., Certificate level, Final degree); (6) is the geography undertaken mainly in day or evening classes; (7) what kind of geography is taught (e.g., is it chiefly commercial in bias or General Certificate geography, etc.); (8) is there much advanced work in geography, i.e., beyond General Certificate stage; (9) is there a Geography Room available for use; (10) is the equipment (visual aids, maps, books, specimens, etc.) satisfactory; (11) is the work in geography expanding, stationary or decreasing? It is upon the answers to these queries and the additional information supplied by lecturers and teachers that this report is based. It may be presumed the information supplied is fairly representative of conditions as a whole. It must be emphasized, however, that the information has been obtained from samples and the conclusions are essentially indicative and not definitive.

Staffing

About 50 per cent of the institutes have full-time lecturers in geography; but full-time appointments are virtually confined to the larger institutions. Not all the major institutes, however, boast a full-time lecturer in geography and one of the largest Technical Colleges in the north of England until very recently had no full-time lecturer in geography. In the smaller institutes the amount of work done in geography often does not justify a full-time appointment. Usually in such institutes, where geography is part of the college work, the teaching is undertaken by a member of staff who is not a trained geographer (in one instance the work is done by a mathematics graduate, in another by the lecturer in English) or by a part-time teacher who is a graduate in geography. A few of the larger colleges have so much work in geography they have two geographers on the staff or employ several part-time day and evening teachers in addition to one member of staff. On the other hand, it must be recognized that many lecturers appointed to geography posts have insufficient work in geography and must assist by taking other subjects.

Only eight of the lecturers are fully trained graduates in geography possessing Honours degrees; six possess the degree of B.Sc. (Econ.) with geography as their special subject; one has a B.Comm. degree; and one a General degree. Generally, however, the work seems to be in competent hands and part-time lecturers where employed are usually fully qualified geographers. But the Technical and Commercial Colleges appear to have very few, if any, eminent geographers: perhaps this is because the Universities and Training Colleges offer better scope and remuneration. According to the Burnham (Technical) grading, very few lecturers are of Lecturer grading, a few are grade "B's," but the majority are on the lowest grade, "A." The status of geography lecturers calls for redress.

Standards of work

In only 10 per cent or so of the institutes is geography taken up to, and including, degree standard. Most of this advanced work is done in evening classes: only five run full-time day courses in degree work. Some 12 per cent of the institutes prepare students for the London Diploma in Geography. Generally speaking the larger and medium-sized institutes (about 30 per cent of the Colleges) do geography up to Intermediate degree standard—usually for the Preliminary and Part One of the London B.Sc. (Econ.) degree. The smaller institutes rarely prepare students beyond the General Certificate of Education (Ordinary Level) standard.

The bulk of the work in geography, apart from General Certificate work, is concerned with the requirements of the professional bodies (e.g., the Institute of Bankers, Civil Service, etc.), and commerce (e.g., the National Certificate in Commerce, Institute of Transport, etc.). In addition many institutes run special courses in connection with textiles (textile geography), engineering, grocery and butchery.

The work in geography

Most of the work in geography, especially full-time day work and advanced courses, has only come into existence since the war. The growing awareness of the importance of geography as a modern discipline and the contributions it can make to present-day life and its manifold problems has resulted in a great expansion in the teaching of geography during the post-war years. But, in spite of the quickening interest and gratifying expansion, there is still much to be done before the situation can be regarded as wholly satisfactory.

As an indication of this expansion an example may be given from one of the larger colleges. In 1947 there were 12 full-time day students taking geography at School Certificate level, 3 at Higher School level and none beyond the Higher stage. At the present time there are 29 studying geography at General Certificate level, 9 at Advanced level and 4 undertaking Finals work. This example may not represent the degree of expansion as a whole though it is fairly characteristic of many (especially the larger) institutes and does illustrate the degree of expansion that has occurred in some institutes.

The demand for geography appears to vary from place to place. One principal wrote that "geography was not a saleable subject." The answer to this is simply that geography has *got to be made* a saleable subject. A place for geography in the curriculum often suffers through time-table difficulties: it often clashes with old-established subjects and, as a parvenu, has to step aside. This is aggravated by the fact that geography can be taken in either the arts or the science courses: science students wishing to take geography find the time-table for geography—which in the first place was probably arranged to fit into the arts time-table—clashes with mathematics, physics or some other science.

Whereas classes in General Certificate level are maintaining their numbers, those in Advanced geography, which in the immediate post-war period showed a sudden and unexpected increase (mainly because of limited places in the Universities and the large number of students taking the advantage of the Government's plan to aid them in their interrupted studies), have tended to fall and at present they are, generally, small and, frequently, have to be closed. This is an unfortunate situation but it is simply a matter of economics: principals and L.E.A.'s are both loath to maintain small classes.

It may be said that the existence of the specialist geographer tends to create the demand, or fulfils the latent demand, for geography. Fourteen replies to the questionnaire indicated that the work in geography was continuing to expand; six indicated a recession in demand over, say, the last five years; the rest intimated the situation was fairly stable. After the post-war boom the situation has by now become more "normal." On the whole, however, it would appear that, though the situation leaves much to be desired, the picture is encouraging.

Little research is undertaken in geography in the Institutes of Further Education. Lecturers, who frequently have to do 20–24 hours lecturing a week in work ranging from General Certificate up to and including Final degree level, find little time to devote themselves to research. Grants for post-graduate work are few and far between and, if available, normally are awarded to students in the sciences or technology. Even so, it must be recognized that in spite of the great odds against them some lecturers are making small contributions in the field of research. It is hoped that these humble beginnings will be encouraged by the appropriate authorities.

Accommodation and equipment

As a result of the great expansion in technical education in the post-war period most institutes are suffering from a shortage of accommodation. The answers to the query on accommodation make it abundantly clear that one of the main problems is pressure on available space. In view of this it is gratifying to find that about 35 per cent of technical and commercial institutes are able to provide a room for instruction in geography. Many of these rooms devoted to geography are, however, not "geography rooms" in the full sense of the term. Very few colleges possess quarters which have been specially designed and equipped for the teaching of geography. A common complaint of many lecturers is that they have nowhere to call a home and sympathy is extended to one lecturer who in his daytime teaching has to use seven different rooms in three distinct premises in the town.

Fifty per cent of the replies to the questionnaire indicated that the situation with regard to equipment (visual aids, globes, maps, specimens, duplicators, cupboards, display cabinets, etc.) was satisfactory or at least satisfactory for the work being undertaken. Many lecturers felt they would like much more but were satisfied they had sufficient tools with which they could do their work adequately. Library facilities do not appear to be as satisfactory; in most cases the library is woefully inadequate. Most departments are in the process of building up geographical libraries and with the limited funds usually available and the high cost of reference books, this is proving a slow business. A geographical library of 200 volumes is unusual and very few institutes possess copies of the chief geographical journals and periodicals other than for the past few years.

Summing up, it may be said that while only in some 20 per cent of the institutes is there much day-time geography, i.e., over about 20 hours per week, and in the smaller colleges the hours of work in geography during daytime are anything between 5 and 12 hours per week, nevertheless geography is gradually finding a place and a position of respect in the Institutes of Further Education. In this matter one can see a repetition of the state of affairs in the Universities during the inter-war period. A great deal, however, depends upon the sympathies of principals and heads of departments. The maintenance and growth of geography, especially advanced study, rests very much with the lecturer in charge; he, of all people, can probably do most to stimulate interest in, and encourage the study of, geography. In only relatively few colleges, however, may geography be said to be well established with a fully trained geographer in charge, with a full range of work from G.C.E. to Finals standard, and with a geography room adequately equipped. In most colleges the geography department, if it exists, is weak and something of a Cinderella; in some it seems to be there only on sufferance.

Two recent developments in Further Education will affect the position of geography in these institutions. In June, 1956, the Minister of Education announced that in the pattern of technical education which is now emerging there will be a concentration of different levels of work in local colleges, area colleges and regional colleges, along with eight colleges of advanced technology, concentrating on advanced, post-graduate and research work in technologies. Much duplication of work will probably be eliminated, and the pattern indicated in this report will be modified accordingly. The advanced work in geography leading to external degrees, will be dropped in certain institutions in order to develop the technologies.

The White Paper on Technical Education published in March 1956, pointed out the need for liberal education for technologists. The Further Education Section of the Geographical Association is anxious that the great value of geography in providing a liberal education in the widest sense will be recognized, and hopes that there may be an extension of the subject in this direction.

Canadian Farms in the Classroom

B. S. ROBERSON

THE STUDIES OF FOUR CANADIAN FARMS in the series *Farming in the Commonwealth** offered by the Association of Agriculture form an important contribution to the growing body of sample study material. The matter is attractively presented and well selected, and, with the exception of some technical agricultural detail, has great relevance for the geographer. Each study consists of a folder containing 22 to 24 foolscap pages of text, maps and pictures, which give a complete review of the farm itself, and some general indication of the agricultural and historical development of the area concerned. In addition subscribers will receive an annual letter from the farm. The farms include a fruit and poultry farm in the Annapolis Valley, a dairy farm in the neighbourhood of Montreal, a mixed farm in Southern Ontario and a grain farm in Southern Manitoba. Provision of coverage for the western part of the Prairie Provinces and for British Columbia is planned.

A standardized, but not rigid, layout has been adopted. Each farm is first located in its regional setting, and personal details of the farmer's family and the historical origin of the farm then build up a vivid picture. There are sections on the farm layout and cropping plan, with details of the main crops, stock, buildings, machinery, labour, climate and soil. Each study concludes with an account of the historical background of the settlement and development of the area. The maps also are standardized. Each folder has three general maps of Canada, showing political divisions and communications, regional divisions and the distribution of the main farming types. There are also a large-scale map of the farm and two maps to locate it within the region. The 8 to 10 pictures, mostly half-page size, are suitable for use with the epidiascope. Within this pattern, special local topics receive appropriate emphasis. Particularly noteworthy here is the description given of the change-over in the Annapolis Valley from fruit to poultry, with the conversion of barns to henhouses; and of the relationship of farm layout in the St. Lawrence lowlands to the historical background and the French Canadian way of life.

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* *Farming in the Commonwealth:* Canada. Nova Scotia, A Typical Farm in the Annapolis Valley; Quebec, A Dairy Farm in French Canada; Ontario, A Mixed Farm in Southern Ontario; Manitoba, A Grain Farm on the Portage Plains. The Association of Agriculture, 53 Victoria Street, London, S.W.1. Price 10s. 6d. each, inclusive of postage and one letter a year.

The farms have been carefully selected. In each case size, layout and crops are representative of the general pattern of the region, and the farmers concerned play a full part in the development of local agriculture. The farm studies will fit correctly and naturally into any normal regional treatment of Canada in schools. Their publication is important for teachers who have previously been forced to spend much time looking for such material; certainly no other comparable information on Canada is so readily available. The account of each farm is thorough. Few questions that the geographer is likely to ask are left unanswered, and ample descriptive detail is given. The references to current trends are particularly helpful to the teacher in bringing text-book information up to date, as, for example, the effects in Nova Scotia of the change to American markets, and the attraction exerted by urban centres on the rural population of Southern Ontario. Although agricultural, the studies are permeated by the attitude of the geographer, and are not overloaded with purely technical considerations.

The defects are few. It is doubtful whether the general maps of Canada are necessary, though they are convenient for reference. The greatest weakness is the omission of contour lines or any other indication of relief from the farm maps, though in other respects these are most comprehensive. This omission is particularly evident in the Annapolis Valley farm, where orchard siting is related to drainage. The general matter, particularly on climate and structure, and to a lesser extent on soils, is probably better studied from standard texts, but we must remember here that, very rightly, the folders set out to give a complete picture to all. Geographers will not welcome the expression that Southern Ontario "is on the edge of a cyclonic area centred in the United States." More details of local climate, climatic effects and soils would be useful. Soil profiles would help to complete the picture.

There is no doubt that these folders should form part of grammar school equipment, if only for teacher reference and the library. With the reservations indicated, they can be well used as topics for sixth form private study. With lower forms, the problems for the teacher are the perennial ones of selection and presentation, of cutting down this considerable amount of material to the limitations of forty-minute lessons, without killing its reality or so condensing it as to make it indigestible. The really essential item is the farm map, which can be studied from a blackboard reproduction, and supplemented by crop and stock details. The pictures present much suitable material for study, particularly if an epidiascope is available. Scattered throughout the folders is the necessary information for the construction of a seasonal record. Such work will convey all that is needed in middle forms of the agricultural geography of the regions concerned, and much of their basic relief and climate. One other problem for the teacher is that of keeping correct proportions. The temptation may exist to use all the farms, in too great detail. The limitations of time on a crowded syllabus imposes its own control, and the solution is probably to use only one or two of the farms during the period allotted to Canada. There will be few teachers who would grudge the time for a substantial study of at least one of them.

This Changing World

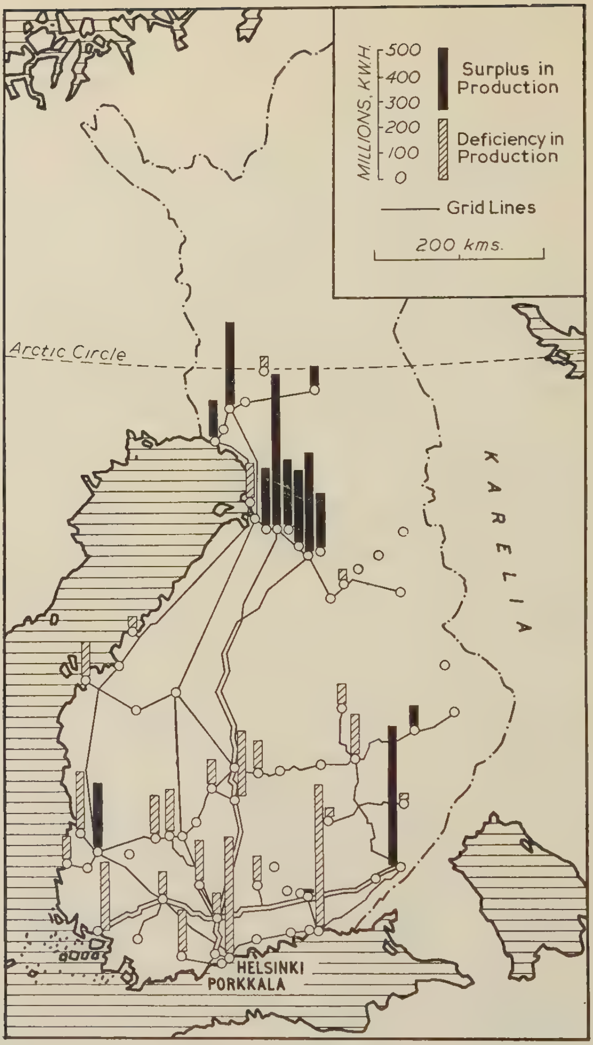
EDITED BY L. S. SUGGATE

FINLAND AND THE U.S.S.R.

Finland, though never more conscious of its West European heritage, necessarily acts in its East European context. Between the wars, it turned its back on the U.S.S.R. and even the traditional eastern trading was abandoned. Since 1944, the Russo-Finnish boundary—though virtually sealed to personal movement—has witnessed a lively commodity traffic. In part, this traffic has arisen from the formidable and precise reparations demanded of Finland by the U.S.S.R. (1944–52); there has also been an independent flow of trade. Since the completion of reparations, a succession of trade pacts has increased Finnish industrial dependence on the eastern market. The swollen metallurgical industry (employing nearly 90,000 people, double the figure for twenty years ago) continues to find outlet there—from the copper products born of east Finnish Outokumpu ores to components for new icebreakers commissioned by Russia from Helsinki yards. Return trade embraces a variety of consumer goods—from fodder grains and bread grains (*c.* 300,000 tons p.a.) to Black Sea wines and, of course, automobiles. Before 1939, Britain and Germany strove for supremacy in Finnish trading: since 1945, the U.S.S.R. has been Britain's greatest rival. In 1954, however, Britain regained its status as Finland's principal source of supply as well as remaining its principal market.

The restoration of Finland's association with Russia is seen in the day-to-day detail of its transport. Superior Russian rolling stock arrives daily from Leningrad at Saarinen's pink granite railway station: Soviet passenger and cargo boats appear regularly during the open season at Helsinki harbour: not merely do Russian civil aircraft travel to Helsinki airport, but Finnish air lines daily make three-hour passenger flights to Moscow: the first Finnish tourist traffic to the Neva was resumed in 1955.

With reparations paid and displaced people settled, Finland thinks increasingly of long-term adjustments within its new frontiers. Its neglected northern third has been called in to redress Karelia. The tithe of its timber lands ceded to the U.S.S.R. in this area is being steadily offset by calling into employment the northern and northeastern forest stands hitherto beyond the economic limit of exploitation. Rising softwood prices side by side with the construction of thousands of kilometres of new timber roads encourage this. Liaison with Norway is sought for the export of land-locked softwoods by way of Finnmark and Troms. A vigorous programme of railway construction also carries new main lines through this under-developed area. Industrial expansion has revealed more than anything else Finland's deficiency of energy. Water power shortage for industry—shorn of its potentiality of the lower Vuoksi river—is being partly offset by linking the southwestern industrial third of Finland by long-distance lines with northern power plants (see map). The Oulu and Kemi river systems are the subject of elaborate hydro-electric plans for providing eventually two-thirds of



Electricity production in Finland—the planned picture for 1958. (Source: *Voima ja Valo*, Helsinki, 1954.)

Finland's water power. These energetic developments are ironical when eye witnesses (and the experience of Porkkala) comment on the Soviet neglect of the ceded lands. But if Soviet parts of former Finnish Karelia suffer disregard, the former Petsamo corridor is not entirely neglected. On the Pasvik river system at Rajakoski and Janiskoski, Finnish engineers have aided in the construction of power plants which are tributary to Russian nickel reduction. Imatra Voima Oy (the state-sponsored power company) has had a special department engaged on this unusual Finnish "export" to the U.S.S.R.

While these adjustments in the economic sphere reflect a new stability in the Russo-Finnish picture, the restoration to Finland of the naval base of Porkkala (380 sq. km.), leased to Russia in 1944 for sixty years, represents a minor modification of the political map. Its formal re-occupation

(January 20–24, 1956) has theoretically enabled the return of a Swedish-speaking minority to its home territory. At the same time, it has given rise to a unique legal problem in land ownership. Porkkala's displaced people have been compensated and resettled on holdings in other parts of southern Finland; this being so, the Finnish Government can claim ownership of the restored territories. At the individual level, the return raises intricate problems—the more so because Porkkala is near enough to Helsinki for its land values to be affected by the urban overspill. Yet, however great the problems resulting, this Russian gesture does not cease to kindle hopes, doubtless vain, among 400,000 displaced Karelians that the U.S.S.R. will one day restore their inheritance as well.

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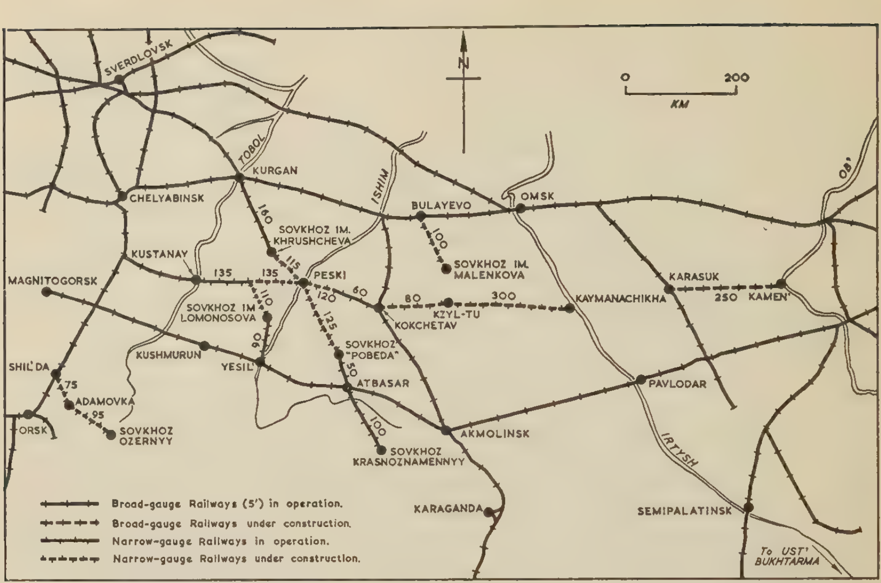
NARROW-GAUGE RAILWAYS IN RUSSIA'S VIRGIN LANDS

Shortage of transport has constantly been one of the limiting factors in the development of the economic potential of the Soviet Union. Transport has been a critical problem in the new project to bring into cultivation virgin lands for grain-growing in northern Kazakhstan. With over 80 million people living in towns and cities, the increase of agricultural production to feed the ever-growing industrial population is an important part of Soviet economic development. During the summer of 1954, the Western press carried frequent reports from Russia of grain piling up in the granaries of the vast State farms in the new wheatlands and of the inability of the authorities to move it to Siberian mainline railheads. To speed the clearance of future harvests in northern Kazakhstan, the Soviet authorities have undertaken the construction of an extensive system of narrow-gauge railways linking the State farms to the mainline railways. The Russians already have considerable experience of light railways, as there are many scattered throughout the Soviet Union, linking mines to mainline railways or ports (e.g. the Taymyr' Polymetal Combine Railway from Noril'sk to Dudinka on the Yenisey and the Tetyukhe-Tetyukhe Pristan' line in the Far East). The comparatively level terrain of northern Kazakhstan presents no great constructional problems. The railway as a means of transport is also well suited to handling sudden bulk traffic after the harvests. Light, narrow-gauge (usually metre-gauge) railways are far quicker and cheaper to build than the Russian 5 feet standard gauge railways and can be easily re-aligned to suit changing conditions. These are all important considerations in a venture in which the chance of success is marginal. The only 5 feet gauge line under construction in the area is a 250 km.-long railway from Karasuk to the rapidly expanding industrial town of Kamen'-na-Obi. The Russians say little about the form of motive power and operation of these new lines; but no doubt the recent discovery of coal at Kushmurun .will mean that steam is used, although the Siberian main-lines are being electrified.

The system, when complete, will involve about 1,580 km. of route centred on Peski. There will be 170 km. of route in the southwest from Shil'da to Adamovka and Ozernyy State Farm. By September 1955, about 600 km. of route were open for traffic, mostly linking the State Farms to the Siberian trunk railways, but also converging towards Peski. A further 200 km. were under construction. A recent report claims that the 180 km.-long railway



Railways in northern Kazakhstan, September 1955. Based on Osnovy Proektirovaniia Zheleznykh Dorog, Moscow, 1954. Distances along new narrow-gauge railways in kilometres.

from Peski to Kokchetav is to be 5 feet gauge; but this seems unlikely unless the Kokchetav-Kaymanachikha line, about 400 km. in length, is also to be broad-gauge. Another solution may be that the railways will be arranged with a third rail to enable trains of both gauges to use them. The Kokchetav-Kaymanachikha railway links the narrow-gauge railway centre and the principal junction at Peski with the Irtysh river. Kaymanachikha will become an important grain-shipping port, and its importance will increase after completion of the Ust'-Bukhtarma Dam above Semipalatinsk. This latter project will allow much larger river steamers than at present to sail beyond Semipalatinsk, thus linking the new wheatlands directly with the growing mining area of the Gorno-Altay and east Kazakhstan.

The future of the entire wheatlands project is in some doubt since the severe criticism of the results of the campaign in the virgin lands made by Mr. Krushchev early in 1956. This has been further strengthened by the recently announced resignation of Professor Lysenko, one of the originators of the scheme.

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EAST GERMANY'S CHANGING BROWN COAL INDUSTRY

The changes, following the division of Germany into "western" and "eastern" zones, in the economic geography of the German Democratic Republic (D.D.R.) or East Germany have mainly affected basic industry, including coal mining and power production. Information from East Germany is rather scanty; this note is mainly based on reports in the weekly economic paper, *Die Wirtschaft.*

Before the war, the area of the present East Germany relied for fuel mainly on its two brown coal fields, one west of the Elbe, in the neighbourhood of Halle and Leipzig, the other, less important, east of the Elbe in Lower Lusatia (see *Geography*, vol. xxxvii, 1953, pp. 18–29). Annual production was about 100 million tons, and all but a few million tons were consumed locally. For certain purposes, such as gas making, firing of railway engines and the making of metallurgical coke, bituminous coal of Carboniferous age was, however, either economically desirable or technically indispensable. In the early 1930s, about 16 million tons a year were brought in from the Ruhr or Silesia for such purposes, and a further 3 million tons obtained from the local bituminous coal mines of Saxony.

In 1945, with the loss of Silesia and the division of Germany, all but the small Saxony supplies were cut off, and the East Germans were faced with three major problems. They had not merely to restore the output of a war-shattered brown coal industry to its former level, but to produce about an extra 70 million tons a year, to make up for the loss of 16 million tons of bituminous coal. Secondly, technical advances had to be made which would enable brown coal to be used for purposes for which it had previously been considered unsuitable. Lastly, if East Germany's ambitious plans of industrial expansion were not to fail for lack of fuel, production had to be raised far above the pre-war level.

The immediate post-war period was one of great difficulty and hardship through fuel shortage, but since then expansion has been rapid. By 1953, brown coal output exceeded the 170 million tons which were the estimated equivalent of pre-war total fuel consumption, and in 1955, the last year of the five-year plan, production reached 200 million tons, 25 million tons short of the target figure. Briquette production was reported in 1954 to be double that of pre-war, which would mean 50–60 million tons a year. The supply of briquettes has lagged even more seriously behind the growing industrial demand than that of brown coal itself, and there has never been a sufficient quantity remaining after industrial requirements have been satisfied to meet domestic demand in full. The same is true of electricity; slow deliveries of electrical machinery, and acute shortages of constructional labour, have delayed the construction of power stations and caused load-shedding year after year. Only the supply of gas appears to have been reasonably satisfactory.

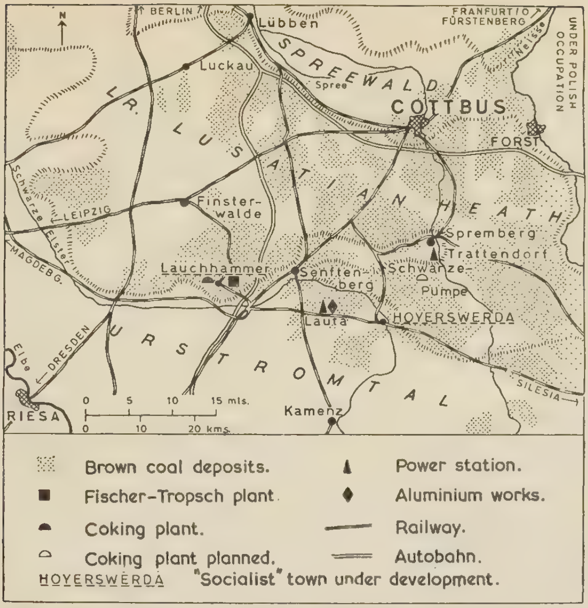
Progress has, however, been made in developing efficient means of substituting brown for bituminous coal. The technical problems of making gas for domestic and industrial purposes had, indeed, been solved before the war, with the *Lurgi* and similar processes for the complete gasification of brown coal. The electrification of the East German railways will also allow the substitution of high ash brown coal burnt in power stations for higher quality coal or briquettes carried on the engine. More revolutionary, if East German claims are correct, is the development of a process for making metallurgical coke from brown coal briquettes. This, it is claimed, will enable the East German iron and steel industry to become independent of imported coke supplies. Future relief may also be expected from the atomic generation of electricity based on the uranium of the Ore Mountains.

In spite of this history of expansion and technical change, the East German government has apparently decided that, unless fuel supplies can be expanded at an even greater rate, the development of industry as a whole will be checked. Accordingly, it is proposing to make sweeping changes in the fuel and power industries during the next 15 years. The aim is not only to increase production, but to make a more economical use of brown coal by treating it as a raw material rather than as a fuel. Two main processes of coal utilization will be used. Coking will provide gas and by-products, as well as coke for the metallurgical and chemical industries. Complete gasification will augment gas supplies, both for fuel and for chemical production. The manufacture of briquettes will be increased only so far as is necessary for supplying the coking plants, and industrial and commercial consumers will burn not coal or briquettes but gas brought to them by a gas grid.

The new plans involve a major alteration in the location of the East German mining and allied industries. The older centre of brown coal mining, west of the Elbe, has now only 20 per cent. of East Germany's remaining reserves. Attention has therefore turned to the less-developed Lower Lusatian field, containing 60 per cent. of the remaining reserves. This field lies beneath the lonely heathland of Lower Lusatia, one of the sandy low plateau blocks into which the North German Plain is divided, and also extends beneath the bordering pro-glacial channel (*Urstromtal*) to the south. Up to the late war, the district concentrated on the supply of briquettes, chiefly to Berlin, and on the manufacture of electricity at public power stations such as Trattendorf. Industry based on brown coal was not as extensively developed as west of the Elbe, although some coal was used in the glass and pottery industries. The first World War saw the establishment of the Lauta aluminium works, the second the building of the plant for the synthetization from brown coal of motor spirit and chemicals, by means of the Fischer-Tropsch process, at Schwarzheide, east of Lauchhammer.

In this relatively thinly populated area, a new industrial complex is being created. The existing open coal pits are being extended, and new ones developed, with the aim of raising production from about 60 million tons a year in 1953 to 107 million tons in 1960. The power station at Trattendorf is being enlarged, and at Lauchhammer, a village of 600 inhabitants in 1946, the first plant for the production of metallurgical coke from brown coal has been erected. In the autumn of 1955, this *Mátás Rákosi* plant was said to have produced its first million tons of coke. By-products, including tar, benzene and phenol, are processed at nearby installations. Gas is already being delivered by means of an 8-mile pipe-line to the Fischer-Tropsch plant at Schwarzheide, and another line is being constructed to serve the steelworks at Riesa, on the Elbe. Meanwhile, 1,000 workers are engaged in site preparation at the tiny hamlet of Schwarze Pumpe, south of Spremberg. Here, in the years 1956–64, the East German state plans to build three coking plants side by side, each with its own briquetting plant, power station and other installations.

Apart from their fundamental importance for the industrial geography of East Germany, all these changes, and others to come, will have an increasing impact upon the Lower Lusatian landscape of heaths and forests. The little village of Lauchammer, we are told in *Die Wirtschaft*, has in the last four years taken on the appearance of "a modern socialist town," and Hoyerswerda is to be similarly extended. Here, the old town is to be given a



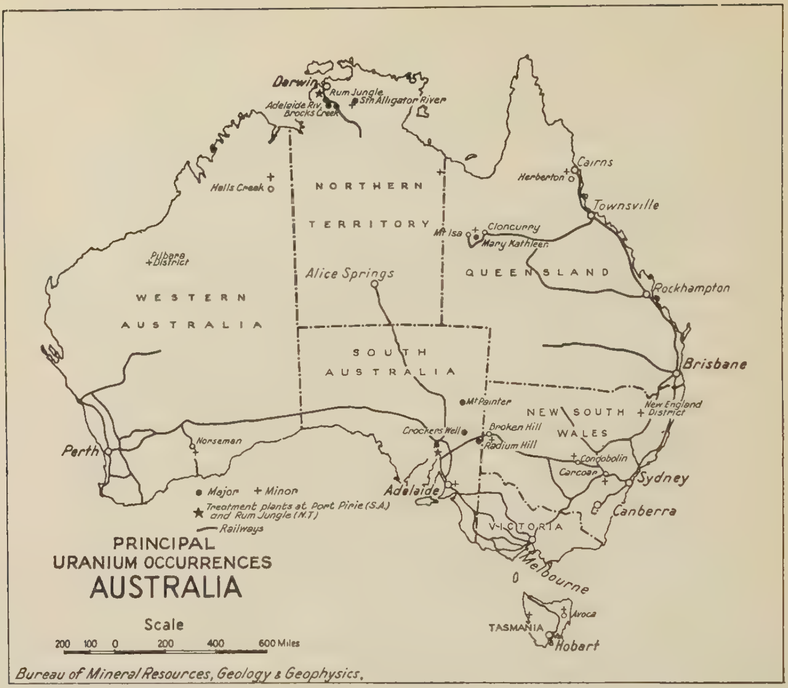
processional way and shopping centre "like the Stalinallee in Berlin," and by the end of 1956, 1,000 new houses are planned. Whatever may be the political future of East Germany, these changes in the pattern of industry, population and settlement will remain as permanent features of the geography of the country.

University of London, King's College T. H. Elkins.

URANIUM IN THE COMMONWEALTH OF AUSTRALIA

Radioactive mineral occurrences have been known for many years in some of the Australian states but, except for those in South Australia, early discoveries were of mineralogical interest only. In 1906 veins containing davidite—an oxide of iron, titanium and uranium—were discovered at Radium Hill, and secondary uranium minerals at Mt. Painter in the same state. A number of companies made intermittent attempts to exploit these deposits up to 1941 but their ventures failed: the deposits were too remotely situated and the ore too difficult to treat to allow competition in the then restricted market for radium.

Interest in the uranium deposits of the continent arose in the closing years of the second world war when supplies were needed for immediate use by the United Kingdom and the United States of America. It first centred on the known deposits in South Australia, where the detailed investigation by the Mines Department of that State of the uraniferous lodes, occurring in rocks of Archaeozoic age, began in 1945. Additional radioactive deposits have recently been found in the State, principally at Crocker's Well, where a new mineral, absite, which contains oxides of uranium, thorium, titanium and rare earths, occurs in a deeply weathered breccia zone resulting from shearing of Archaeozoic rocks. Simultaneously with the exploration and development of the lodes at Radium Hill, the Commonwealth Scientific and



PRINCIPAL URANIUM OCCURRENCES
AUSTRALIA

Bureau of Mineral Resources, Geology & Geophysics.

Industrial Research Organization and the South Australian Mines Department carried out research into the treatment of these refractory ores and in 1955 production of uranium oxide began at a chemical treatment plant established at Port Pirie, using Radium Hill ore.

The first production of uranium oxide in Australia, however, was at Rum Jungle, Northern Territory, where deposits were discovered in 1949 and a treatment plant began operations in 1954—a year in which a "uranium boom" occurred, following further discoveries in Northern Territory and northwestern Queensland, when some 35 mining companies were actively engaged in uranium search or development. At Rum Jungle, small quantities of oxidized copper ore had been mined from time to time in the past 70 years, but the association of uranium with the copper mineralization was first realized in 1949 when a prospector found secondary minerals subsequently identified as torbernite and uranium ochres. Since then, a number of deposits in which lodes bearing copper and uraninite have replaced carbonaceous shales of Lower Proterozoic age have been proved in the area and brought into production. The plant for their treatment was erected by Territory Enterprises Pty. Ltd., a subsidiary of Zinc Corporation Ltd., on management fees from the Commonwealth Government, which set up in 1953 the Australian Atomic Energy Commission as a central authority to co-ordinate the mining and production of uranium in Australia.

Discoveries at Rum Jungle were followed by intensive prospecting in the Katherine-Darwin region; a number of deposits carrying primary oxides or secondary uranium materials have been found and investigated. Two of these, at Adelaide River and Brocks Creek, have produced small quantities of ore subsequently treated at the Rum Jungle plant which acts as a customs mill. A number of deposits comparable with those of Rum Jungle have been found in the South Alligator River area. Production from these depends on whether current investigations prove sufficient ore to warrant the erection of a treatment plant in the area.

Active prospecting in Precambrian rocks of the Cloncurry–Mt. Isa region in northwestern Queensland led to the discovery of a number of radioactive deposits in 1953–4. Most of these are small and the ores are complex but some may be worth developing when a treatment plant is operating in the region. The major deposit found to date is that at Mary Kathleen where extensive development is under way and where a treatment plant is planned. Uranium deposits in the region include a mineral similar to davidite, and lodes carrying one or more of a variety of primary uranium-bearing minerals including pitchblende.

Evidences of radioactive minerals have also been found in Precambrian rocks of Western Australia and of the Broken Hill district in western New South Wales, including occurrences of davidite which broadly resemble those at Radium Hill. The search for radioactive deposits is still in its early stages and production of uranium oxide is as yet small. All the occurrences referred to here are found in Precambrian rocks, which are the most likely to yield uraniferous deposits (although evidences of these have been found in Tasmania in Palaeozoic rocks of the Tasman geosyncline) and scientific prospecting, using modern air-borne and ground techniques, is being systematically extended, particularly over the wide areas of the Australian Precambrian shield.

Commonwealth Bureau of Mineral Resources, L. C. NOAKES.
Canberra

The Geographical Association

SPRING CONFERENCE, BRIGHTON, 3RD–7TH APRIL, 1956

We are indebted in very large measure to the committee and officers of the Brighton Branch for the organization of a splendid conference which was attended by over 200 of our members. Brighton proved to be an admirable centre for such a meeting and made possible the arrangement of a number of excursions in the Wealden district, details of which it may be possible to publish in due course. The excursions were supported by lectures given by Professor S. W. Wooldridge and Professor D. L. Linton, mainly concerned with aspects of the physical basis of the local geography, and by Dr. H. C. K. Henderson on Brighton. Professor S. H. Beaver entertained us in lighter vein with a description of some American travels. To these speakers and equally to the several leaders of the excellent excursions, we extend a warm vote of thanks.

A notable feature of the conference, for which we also record our sincere thanks, was the reception and lavish hospitality kindly given by the Mayor and City of Brighton in the spectacular setting of the Royal Pavilion. On this occasion we were delighted also to meet our President, Lord Nathan, accompanied by Lady Nathan.

The organization of our Spring Conferences has become a major problem in recent years, when such large numbers require accommodation and reservations for excursions. The Brighton Branch, and in particular Mr. Fry, the Conference Organizer, are to be congratulated most warmly on the excellence of their arrangements and the smooth organization of the meetings.

ANNUAL CONFERENCE, 1957

The Annual Conference will be held from 1st to 4th January 1957 at the London School of Economics. The joint meeting with the Institute of British Geographers and the Royal Geographical Society will be held at the R.G.S. House on Tuesday, 1st January, when Lord Nathan will give his presidential address on "Geography and Air Transport." Accommodation will again be available at Campbell Hall, and information about reservation procedure will be given in the printed programme which will be sent to members during November.

HERBERTSON MEMORIAL LECTURE

A Herbertson Memorial Lecture, to be delivered by Professor L. Dudley Stamp, which was to have been given on 20th October in Sheffield, is now postponed and we hope instead to include it in the programme of the Spring Conference which will be held at Matlock from 23rd to 27th April 1957.

ANNUAL SUBSCRIPTIONS: RENEWALS AND COVENANTS

The annual subscription of £1 1s. falls due for payment on 1st September. Annual members are asked to renew their subscriptions as early as possible, using the renewal form supplied with this issue of *Geography*; subscriptions sent promptly will ease the work of headquarters office, which should also be advised of any changes of address.

It is still possible for arrangements to be made for the covenanting of subscriptions by members who pay income tax on some part of their income at the Standard Rate (at present 8s. 6d. in the £). Such covenants, which run for a period of seven years, benefit the Association without further expense to the covenantor, by the refund of tax already paid on the amount of the subscription by the member. Appropriate forms will be supplied upon application to headquarters office, and we would urge the many members who have not already undertaken to covenant their subscriptions to help us now in this way.

STUDENT SUBSCRIPTION RATE

Because of recent further increases in publishing and other costs, we are reluctantly obliged to increase the privilege subscription rate for students from 8s. to 10s. per year starting with the period commencing 1st September 1956.

UNWANTED ISSUES OF *Geography*

Spare copies of a number of recent issues of *Geography* are urgently required at headquarters, and members who no longer wish to retain these copies would help us by returning them to the office.

The issues are: Vol. xxxvi, 1951, November, part 4.
Vol. xxxvii, 1952, July, part 3.
Vol. xxxviii, 1953, November, part 4.
Vol. xxxix, 1954, January, part 1.
Vol. xl, 1955, November, part 4.

Headquarters office is also willing to receive runs of *Geography* of which members wish to dispose.

A Geographer's Reference Book

The first edition of this book edited by Mr. C. H. Saxelby for the Geographical Handbook Committee and distributed for the Committee by the Geographical Association is now exhausted. A reprint with certain revisions will be published in the winter of this year and will again be obtainable from the Association's headquarters office. Advance orders for this limited reprint edition can be accepted now; the price of the book will be the full published price which will be announced later (*about* 15s.).

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

In 1956 the meeting of the British Association is to be held in Sheffield from 29th August to 5th September. The Geographical Association will welcome visitors at its headquarters from Sections E (Geography) and L (Education), on two afternoons, when refreshments will be served. There will be a special exhibition of early geography textbooks, selected from the Association's special collection, to illustrate changes in the teaching of our subject. We are grateful to the Royal Geographical Society for the loan of a number of books for exhibition and to Mr. Jay, our Honorary Librarian, for his work in organizing this exhibition.

CONFERENCE ON ARCHAEOLOGY AND SCHOOLS

Members are invited to attend a conference on archaeology and schools organized by the Council for British Archaeology, on Saturday, 6th October, at the University of London Institute of Education. Details of the programme may be obtained from the Assistant Secretary, Council for British Archaeology, 10 Bolton Gardens, London, S.W.5.

Reviews of Books

With very rare exceptions, books reviewed in this journal may be borrowed from the Library by full members or student library members of the Association.

The British Moorlands: a problem in land utilization. J. Fraser Hart. 14 × 21·5 cm. viii + 98 pp. Athens (Georgia): University of Georgia Press. 1955. $2.00.

This book is well written and nicely integrated and contains valuable information about selected farms and afforested areas. A useful description is also given of the relationships between the different kinds of farming in the Tweed Basin. Sweeping generalizations about British moorlands in general appear to have been based on detailed work done solely in the Southern Uplands of Scotland and the Gwydyr Forest of North Wales, however. The range of the material which is touched upon here is far beyond the legitimate scope of a small book and although a description of upland ecology has been attempted, the space available has made misleading generalizations inevitable. Furthermore, the term "moorland" is never defined ecologically and the distinction between moorland and upland heath is ignored. These deficiencies would be excusable if the author had concentrated on producing a detailed inventory of our unimproved upland areas, but this is not attempted.

The book will provide useful preparatory reading for field classes provided students are warned against the frequent over-generalizations about the historical, social and physiographic background. The bibliography is particularly valuable for its references to the farming and forestry of British uplands.

S. R. E.

Stonehenge. R. J. C. Atkinson. 14·5 × 22·5 cm. xv + 210 pp. London: Hamish Hamilton. 1956. 16s.

A leader in Stonehenge research here writes simply and imaginatively of the great monument and gives fine illustrations. About 1900–1800 B.C. began the making of the circular bank and the setting up of the Heelstone. At some time between 1750 and 1550 B.C., the period of the Beaker people and Irish-British trade, the blue stones were brought from Carn Meini, Preseli, a landmark for boats from Ireland and probably sacred as was Sunium (with its cliff-top temple) a landmark for boats going to Athens. One stone from Cosheston hints at the route from this hill to Milford Haven. Thence rafting along the south Wales coast brought the stones to the Bristol Avon. Up this river and the Frome probably by double canoe, and, with a short drag to the Wylye, they reached the Salisbury Avon and were dragged up from Amesbury. 1500–1400 B.C. saw the transport and dressing of the great sarsen stones from the Downs north of Marlborough and the re-arrangement of the blue stones inside the Sarsen circle and horseshoe. Incisions of metal axe and even a dagger form on the sarsens confirm evidence from tomb treasure near Stonehenge that this was a period of Mediterranean trade and contact with the Mycenean civilization. Later still, hostile hands damaged the west part of Stonehenge, the finest prehistoric monument in Europe north of the Mediterranean. Methods of ancient erection of the stones are interestingly discussed. H. J. F.

Bridgend: the Story of a Market Town. H. J. Randall. 14·5 × 23 cm. xv + 156 pp. Newport: R. H. Johns Ltd. 1955. 21s.

For over seventy years an acute and inquiring mind has been stimulated by the development and setting of Bridgend. Mr. Randall's services to scholarship are honoured throughout Wales and here he contributes to the main stream of Welsh history a tributary of local history and a tribute to his native town.

With the aid of maps and prints the author describes the geographical background and history of Bridgend. He includes graphic details of its people, ranging from a humble eighteenth-century housewife to the philosopher Richard Price, who has European significance. In discussing modern Bridgend, he places industry, communications, religious and public buildings in their regional and national setting. A valuable feature is the use and analysis of manorial surveys and contemporary topographical writing. The book is no uncritical adulation of Bridgend. It includes amongst other criticisms a horrifying picture of mid-nineteenth-century slums which existed until Bridgend, and Britain generally, was "frightened into sanitation."

The book could serve as a pattern for local historians of all ages. May they bring to the study and description of their own locality the extensive field work, skilful use of documents, wisdom, zest and wit which pervade this work. M. D.

Southern Europe. A Regional and Economic Geography of the Mediterranean Lands. M. I. Newbigin. 14 × 22 cm. xx + 404 pp. London: Methuen & Co. Ltd. 1952. 30s.

Dr. Newbigin's classic work was first published in 1932 and reviewed in vol. xvii of this journal. Serious revision was out of the question when the second edition was issued in 1944 and was deferred until 1949 when the task of revision was undertaken by regional specialists under the direction of R. J. Harrison Church. Every mature student of the geography of Europe must be familiar with this book and the only purpose of a notice so long after publication of the revised edition is to acknowledge the debt which teachers of geography owe to the revisers for their care in bringing facts and figures up to date without materially changing the style and method of treatment of the original. It is to be hoped that further revisions will be undertaken on the same lines as occasion demands for the benefit of future generations of geographers. A. J. H.

Image de l'Espagne. Jean Sermet. 21 × 27·5 cm. 99 pp. Paris: Librairie Larousse. 1954. 950 fr.

This album of 145 photographs, arranged regionally and fully explained by captions, is intended primarily for tourists or intending visitors to Spain, but the choice of subjects has been made by a geographer with an artist's eye, and the album would serve admirably to introduce the sedentary student to the Spanish scene. The different types of scenery are adequately depicted; architecture, church and domestic, is delightfully illustrated; and the pictures of dances and processions are full of life and movement.

There is not here the rich browsing of the author's *L'Espagne du Sud* (1953), also written primarily for the tourist and a book of unusual evocative power—whether by virtue of language or of training, they seem to order these matters of regional description better in France. But the text introducing each regional section, though concise, is exceedingly suggestive, with, for example, a hint of the shifting centre of gravity, political and economic, in Spain; an occasional loose statement, as in the highly provocative paragraph on "l'homogénéité anthropologique" (p. 6) can very often be modified by the discerning reader from other parts of the text.

An unfortunate misprint disguises the tectonically interesting Sierra de Altomira, in Guadalajara, with its important system of storage reservoirs. R. A.

The Dalmatian Coast. Anthony Rhodes. 14·5 × 22 cm. 144 pp. London: Evans Brothers Ltd. 1955. 12s. 6d.

This well-produced, easily handled book gives a useful general background to the Dalmatian coast. Mr. Rhodes is enthusiastic about his subject and we are left in no doubt about the attractions of Dalmatian scenery and architecture. His neat description of the coast is augmented by apt quotation from historical sources and by personal anecdotes all very much to the point. A delightful picture of Dalmatia emerges. The book will appeal especially to the tourist who has a visit to Jugoslavia in mind. It should also be a useful companion book for the school library. It is a pity, however, that the author has not called upon geography to the same degree as upon history in his explanatory descriptions. The karst, for example, is barely mentioned, nor is there any attempt to analyse the position of any of the towns which he otherwise so ably portrays. The book is illustrated with some excellent photographs. There is a little inconsistency occasionally about place-names; for example, "Kurzula" is used on the map and "Kurcula" in the text, but this is understandable in an area where so many alternative names exist for the same place. H. R. W.

Tyrolean Journal. C. H. Warren. 14 × 22 cm. vii + 190 pp. London: Robert Hale Ltd. 1954. 16s.

This is an interesting account in diary form of the author's stay in the Austrian village of Erhwald from 22nd September, 1952 to 22nd July, 1953. Erhwald lies at 3,000 feet near the German frontier and is a small agricultural community, similar to many others throughout Alpine Austria. Hay and potatoes are the chief crops and the few cows in each farmstead are the pivot of the farming economy. Transhumance is particularly well described; indeed the value of this book to teachers of geography lies in its detailed and exact description of village life. It is a pity that no maps are included but no reader can fail to appreciate the closeness of the Tyrolean peasants to the soil. R. C. H.

The Far East. C. A. Buss. 16 × 24 cm. viii + 738 pp. New York: The Macmillan Co. 1955. 45s. 6d.

In this new "history of recent and contemporary international relations" Professor Buss uses the term Far East to connote that part of Asia which extends from the

Bering Straits through China, Japan, and southeast Asia to the eastern borders of India. Such a coverage rests on a common American assumption that southeast Asia has closer affinities with China and Japan than with India and Pakistan (to which only passing reference is made) and to this extent the book as a whole may seem out of perspective to many British readers. In the reviewer's opinion, however, there is much to be said for the standpoint which the author has adopted and his emphasis on China as the centre-piece of the Oriental world is particularly timely at the present juncture.

The book falls into four sections, of which the first provides a rather sketchy geographical and historical introduction to the area and the second an outline of the policies of the major external powers, and the reactions thereto of China and Japan, down to the outbreak of the Pacific War. The third section, consisting of only one chapter, covers the war itself and the remainder of the book, some three hundred pages, is devoted to the "decade of transition" which followed the defeat of Japan in August 1945.

To the geographer anxious to keep abreast of recent political changes this last section is a most useful compendium of information. But one could wish for a fuller treatment of the economic and geographical background to the events which are discussed, and the book would be greatly improved by the inclusion of more and better maps. C. A. F.

The Nile Basin. Fourth Supplement to Vol. III. xii + 359 pp. 1954. 20s. Fourth Supplement to Vol. IV. vii + 349 pp. 1953. n.p. Second Supplement to Vol. VI. vii + 205 pp. 1955. 40s. H. E. Hurst and others. 19 × 27·5 cm. Cairo: Ministry of Public Works, Egypt, Nile Control Department.

These three new supplements continue the great series of volumes of hydrological data for the Nile system which Dr. Hurst and his colleagues have been producing since Vol. I appeared in 1931. The format and range of material in each case repeat those of earlier supplements, these new volumes bringing the records more closely up to date. Thus the first item listed, the 4th supplement to Vol. III, is concerned like its predecessors entirely with gauging records. The third supplement, published in 1946, brought these records up to 1942. The new volume contains the 10-day and monthly mean gauge records for the same 150 or so stations for the years 1943 to 1947, and extends the normals up to the same date. A preliminary list of the gauging stations is included, with the best available level values referred to mean sea level at Alexandria. The second supplement reviewed (the 4th supplement to Vol. IV) in similar fashion extends the discharge records of Vol. IV and earlier supplements up to 1947. As in previous supplements, mean discharges for each 10-day period during the year are given for each year in the period under review (1943–7), and the earlier corresponding normals have been recalculated to bring the total period up to 1947 from the general starting date of 1912. The third supplement (second supplement to Vol. VI) is concerned with rainfall statistics. Contents and layout in general follow the lines of Vol. VI itself and its first supplement, but the data are now extended over the period 1943–7. As before, we have tables giving actual monthly and annual totals for each of the five years concerned at each of the 350 or so stations, together with numbers of rainy days; tables of monthly and annual normals extended up to 1947; a table of representative normals for each district within the Nile Basin; and tables, brought up to 1947, of the highest recorded daily and annual, and lowest recorded annual precipitation for every station used. As before the records of sample stations are also given in graphical form, and the general rainfall map of the basin has been amended to conform with the extended records.

There is little for the reviewer to add to this factual statement, for the volumes are entirely statistical, and not for the general reader. They comprise however record and reference material of the highest importance, amplifying and enriching what has gone before, and it is to be hoped that the publication of this unrivalled series of hydrological records will be continued in the future without a break.

R. F. P.

The Red Sea Mountains of Egypt. L. A. Tregenza. 14·5 × 22 cm. 247 pp. London: Oxford University Press. 1955. 21s.

This book is an account of three months' travel, on foot, through the mountainous area between the Nile and the Red Sea in Egypt. The author knows the Eastern Desert well from previous journeys and the account is enriched by his observations and discussions of the numerous archaeological remains visited. He displays an affection for the country and its wild life, and his conversations with his Arab guides are particularly valuable in demonstrating both their practical and mental reactions to their uninviting environment. The book is written in a lucid but somewhat monotonous style. There are 17 photographs and a double-page map: this is especially valuable since it includes the major geological formations as well as the author's route and, in elementary form, the relief. It is a disadvantage, however, that the book must be opened near the end and turned round whenever the map is consulted —frequently necessary with Arabic place-names. This book is a useful addition to the limited literature upon this part of Egypt and the fact that geology and physical geography are not overlooked adds to its value as a background book for the geographer.

A. B. M.

African Worlds. C. Daryll Forde (ed.). 16 × 25·5 cm. xvii + 243 pp. London: Oxford University Press for the International African Institute. 1954. 30s.

The title of this book is rather misleading. It is in fact a suite of 9 studies—by distinguished anthropologists—of social values and cosmological ideas in 9 different African communities. The geographer will lament the total absence of maps or indeed of any other evidence of consideration of the background in which these peoples live. It is not even evident from the individual studies that they are all in Africa and in some cases the setting might be Greenland. While geographers may be bewildered by this lack of recognition of the environment, they cannot blame anthropologists for not being geographers.

Man is far from being logical and when he does not understand he usually builds a fabric of myth and ritual instead. Such ideas, fantastic though they may be by "Western" standards, are the cement which gives strength and cohesion to society, especially simple societies. Often, therefore, a geographical study of an African group may fail to bring understanding of them if in fact they are motivated more by such fantasies than by the realities of nature. It is because this so often happens—and without the knowledge of governments—that studies like these have a high value.

R. M.

African Turmoil. I. McDougal. 14 × 22·5 cm. 192 pp. London: Elek Books Ltd. 1954. 16s.

This book covers the British territories of East and Central Africa and refers especially to the background of Mau Mau in Kenya ("a violent African attempt at racial isolation") and of Central African Federation ("a European attempt at racial partnership"). The author, a professional journalist, does not try to push his own opinions. Rather he gives his impressions of meetings with numerous individuals who address the reader through full records of the conversations held with them. The most significant of these conversations have been chosen: discussions with, or speeches from, British settlers, business men and officials, African trade unionists, Indian traders, American visitors, Arab merchants and many others.

Mr. McDougal himself points out that his book is not meant "as a commentary on the subject of Central African Federation" and in a sense it is not a good introduction to Central or East African problems since the uninformed reader may all too easily adopt as his own the opinions expressed by individuals interviewed—the more forcibly held the point of view, the more readily accepted it may be. But any reader will benefit from the brief introductory notes given in some chapters and will recognize the complexity of the African turmoil and the deep cleavage of opinion behind the diverse elements in the African scene. Those with some knowledge of African conditions will find Mr. McDougal a stimulating and helpful guide who will help them to breathe the somewhat troubled air of Africa today. R. W. S.

Peoples of the Lake Nyasa Region. M. Tew. International African Institute. Ethnographic Survey of Africa. Daryll Forde (ed.). 17 × 24 cm. x + 131 pp. London: Oxford University Press Ltd. 1950. 10s. 6d.

The Basuto. Hugh Ashton. International African Institute. 14 × 22·5 cm. xi + 355 pp. London: Oxford University Press Ltd. 1952. 35s.

These two studies are ethnographic and sociological in approach rather than geographical. Of the two, *Peoples of the Lake Nyasa Region* is the more condensed and contains less geographical information. *The Basuto* has some descriptions of agricultural practice which are useful, and the paragraphs on the villages (pp. 21–25) make interesting reading for the historical geographer since they are concerned with peoples, and not lands or the inter-relationship of lands and peoples. As such they are too detailed for school use, but contain information that might well be valuable in an advanced regional course. E. M. Y.

Zambesi River. J. F. MacDonald. 14 × 22·5 cm. viii + 240 pp. London: MacMillan & Co. Ltd. 1955. 18s.

This is not a textbook, nor does it fall simply into the category of travel books. It is rather a study of the Zambesi basin in which the various topics discussed are loosely linked, as to a central theme, with a description of the course of the river. The journey down river, and the incidents thereof, occasion the introduction and the discussion of such subject matters as soil erosion, climate, insect pests and diseases, colour and race issues, and the effect on tribal society of the growth of the mining industry with its attendant labour demands. The description and the discussions are excellent. The author succeeds, with his verbal pictures, in conveyingthe "feel" of the country far more accurately than is possible with photographic illustrations, no matter how many. He thus provides a good supplement to the standard texts, and the book is strongly recommended for sixth form and college use. E. M. Y.

South and Central Africa (The World in Colour series). Dore Ogrizek (ed.). 14 × 19·5 cm. 431 pp. London: McGraw-Hill Publishing Co. Ltd. 1954. 30s.

This book, despite its title, deals, in varying degrees of detail, with most of Africa south of the Sahara, and with special reference to French Africa. This emphasis arises from the fact that the book is a translation of a French edition, to which some valuable material on southern Africa has been added by Mr. Roy Macnab. A long introductory section describes such varied subjects as Africa's past, negro art, witch doctors and big-game hunting. More than 100 pages are devoted to Southern Africa, but less than 40 pages to Eastern Africa (with the British areas described very inadequately), and only 50 to Equatorial Africa. Western Africa occupies 100 pages, three quarters of them describing the various French territories. The translation is generally good, though there are occasional slips and odd phrases, such as the description of Sierra Leone as the "white man's tomb."

A CONCISE GLOSSARY OF GEOGRAPHICAL TERMS

EDITED BY J. C. SWAYNE

The compilation of this glossary, containing about three thousand terms, has been based on a wide variety of sources, and the entries included, necessarily selective, have been chosen with great care. The glossary is intended mainly for students, and includes terms used in examination papers set for the General Certificate of Education at Ordinary, Advanced and Scholarship Levels, as well as those used in papers set during the last five years by University examiners for the B.A. (Honours) and the B.Sc. (Special) degrees. Other terms have been selected from text-books and geographical works of recognized importance recommended to students for study, as well as from articles which have appeared in various geographical journals.

All important geographical works, including works of reference, have been closely examined to ensure the general acceptance of these definitions. Further, where glossaries of a restricted nature have been published, the author, with permission, has drawn from them.

Every definition has been given the fewest possible words, and those incorporated in place-names have been given in an appendix. Tables relating to Geology and Meteorology etc. also appear as appendices.

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The book certainly supplies useful information for those who are already knowledgeable on matters African. The wealth of beautiful coloured photographs and drawings often conveys the truth better than the text which is somewhat uneven and, on occasions, misleading and even inaccurate. Despite its pictorial maps and its index, it is in no sense a guide-book. One must admit, albeit reluctantly, that books such as the recently published 1956 editions of the well-known Year Books and Guides to Southern Africa and East Africa provide, in a stereotyped and less interesting manner, something that this volume fails to give. Yet it does present a living picture of the new Africa that is emerging from the dark, backward continent of the past and underlines the necessity for an ever-growing partnership of black and white.

R. W. S.

Natal Regional Survey. Vol. 3. The Distribution of Population in Natal. T. J. D. Fair. 22 × 14·5 cm. xiii + 98 pp. London: Oxford University Press Ltd. 1955. 30s.

Here is a regional survey of Natal by a geographer who has come to know its varied landscape through extensive reconnaissance and meticulous fieldwork. It completes the analysis of population which was begun in the second volume of this series. Whereas Volume 2 was a demographic treatment, based primarily on vital statistics from census records, Volume 3 is a geographical study of past and present patterns of human settlement in relation to physical, biological, economic and historical factors.

Since Natal is effectively isolated by the Drakensberg escarpment from the flat uniformity of the *platteland*, these factors exert a powerful influence, and the author rigorously analyses the population of the whole province in these terms. His chapters on the Agricultural Population and the Native Areas, detailed and dispassionate, reveal all the characteristics of a robber economy over much of a region which it is hoped to make the "larder" of the Union.

The text is supported by numerous distribution maps and diagrams, which are the clearer for not being overloaded with detail. This is not perhaps a book for the school library, but every college and university should have a place for it.

D. L. N.

Economic Geography of West Africa. F. J. Pedler. 22 × 14·5 cm. xii + 232 pp. London: Longmans, Green & Co. Ltd. 1955. 16s.

Whatever its title, this book is an authoritative account of the rapidly expanding economy of British West Africa by one who has carefully studied his subject at first hand. The presentation is straightforward and readable and the summing up of the many controversial matters fair and impartial. We are given much information which is not only up to date and accurate, but is normally hard to come by. References to territories other than the four within the Commonwealth are scanty and serve to complete the picture of the latter rather than to give an adequate impression of the former.

On the geographical side the book is not so happy. The material is sketchy and frequently inaccurate. This applies particularly to the chapters on Land and climate and Soils, water and pests. Subsistence production, so important in West Africa and about which so little has been written, receives inadequate attention.

Nevertheless, this is a notable addition to the scanty geographical literature on West Africa in English. It will be invaluable not only to teachers and students, but to all those interested in this remarkable region. Maps and illustrations are excellent and there is ample statistical information.

H. P. W.

Tiv Farm and Settlement. Paul Bohannan. 20·5 × 33 cm. ix + 87 pp. London: H.M.S.O. 1954. £1 7s. 6d.

Visitors to Nigeria usually see Tiv people for the first time from the train between Makurdi and Enugu. Numbering altogether three-quarters of a million they are the largest of the non-Muslim tribes in Northern Nigeria. For several decades they have been increasing in numbers, and while the southern part of the tribal territory near the frontier with the Eastern Region is over-populated, a pioneer fringe in the north and east is constantly moving forward into sparsely settled land in the Benue Valley.

In this penetrating study, Dr. Bohannan, who has spent two years living with the Tiv explains a difficult relationship; interwoven social and blood ties with rights in land. There is a nice adjustment of size of farm to size of family and rights are held not to specific plots of land but to a certain quantity of land. All this goes towards explaining the mechanism of the expansion of Tivland

This anthropological study is of particular interest to the geographer because of the important part survey played in the field work and the use made of maps in this report. In addition, it illustrates some of the consequences of land shortage which appear to apply to much of Africa; changes in cropping, modifying of tenure custom and growing economic differentiation. It helps one to understand how the acceptance of a completely new idea, such as land having a cash value, would involve the disruption of the tribe, and forces one to consider whether tribal communities can be welded together into even a federal state, or whether they must all go into the national melting-pot. This study is a credit not only to the author's scholarship but also to his ability to mix with and understand Africans. A. T. G.

U.S.A.: its geography and growth. United States Information Service. 26 × 21 cm. 124 pp. London: John Murray. 1955. 10s. 6d.

This well-illustrated little book presents a vivid picture of the landscape of the United States and of life in the contrasting physical regions. Its aim is to give an impression, rather than to serve as a textbook, but the approach is strictly geographical and teachers will find it an exceedingly valuable introduction to more serious study. The photographs are an essential part of the descriptions and not mere decoration, and, while one may be surprised to find that the coloured photograph of New York harbour is at least seventeen years old, they are very effective. A. McP.

Anahuac: tale of a Mexican journey. M. Chadourne. 14 × 22 cm. xi + 196 pp. London: Elek Books Ltd. 1954. 18s.

The author recognizes that one cannot hope to know a country in a few months, but he believes that "even brief contact with man and landscape may . . . shed a flash of light on the evolution and the problems of a country" such as Mexico and he has sought "to communicate something of these 'moments of vision,' of this transient but illuminating experience." Therein seems to lie the key to the limitations of this book. Themes and topics are emphasized by excessive subdivisions of the text and the disjointedness thus introduced is not eased by a style of writing that strives for evident literary effect. The illustrations are undistinguished and have little contribution to make towards an expression of the essential characters of the places visited. The book will probably be appreciated more as a source for "vignettes" than as a study of modern Mexico. N. P.

The Sunlit Caribbean. A. Waugh. 14.25 × 22 cm. 160 pp. London: Evans Bros. Ltd., 1953. 12s. 6d.

This is a very light and superficial treatment of some aspects of the French and British West Indies, written for the tourist and those who are interested in the area but possess no knowledge of it. A chapter on West Indian history is the most useful part of the book, but the remainder is a medley of facts amid one or two good stories giving local colour. There is a nineteenth century attitude evident in the treatment, and considerable stress is laid on the "up-rooted" characteristics of the West Indian peoples. The author appears to see nothing of the rich Caribbean culture and unity which is now evolving. The illustrations are good. Read very critically, it could provide useful additional background material for the college student interested in these western colonies. G. J. B.

The Australian Way of Life. G. Caiger (ed.). vii + 158 pp. 1953.
The South African Way of Life. G. H. Calpin (ed.). ix + 220 pp. 1953.
The Norwegian Way of Life. F. Castberg. xi + 110 pp. 1954.
14 × 22·5 cm. London: W. Heinemann. 12s. 6d. each.

These are the first three titles in a Series prepared under the auspices of the International Studies Conference, with financial assistance from UNESCO. Their aim is to describe ideals and values of the people in the selected countries, presenting attitudes towards life rather than particular ways of earning a living. The approach is thus primarily philosophical, not geographical.

Differences in national ethos are reflected in the varied treatment of the general theme. The volume on Norway is the work of a single author (with the exception of a short appendix on the economic structure, contributed by Prof. Keilhau), and devotes much attention to constitutional and political values. The work on Australia is a symposium by seven writers each of whom considers one aspect of cultural adaptations in a warm environment. The book on South Africa, with its significant sub-title "Values and ideals of a multi-racial society," stresses the conflict of outlook between the various elements in the population of the Union. It is a compilation made by more than a dozen contributors.

These volumes, of pleasing appearance, provide in handy form a valuable complement to the material available in standard texts of regional geography. They will probably give most satisfaction to readers who already know something about the countries concerned, and teachers will find here many useful topics for sixth-form discussions on the world today. All the books are illustrated with clear photographs, but there are no maps and the volume on Norway is the only one to provide an index.

L. J. J.

The Way of the World. G. H. T. Kimble. 15·5 × 22·5 cm. x + 123 pp. New York: George Grady Press. 1953. $2.50.

The aim of the trustees of the Rushton Lectures is to present to the people of Birmingham, Alabama, eminent authorities in the various social and economic disciplines who will stimulate the community through their public lectures. The three lectures delivered by Dr. Kimble must abundantly have fulfilled the objects of the trust and it is a service to geography that they are more widely available in an expanded published version. Their purpose is to demonstrate how the modern geographer with his "down to earth" study possesses a rewarding vantage point from which to observe the way of the world. The themes developed are The Strength of the Earth (regard for the limitations as well as for the capacities of places), The Perseverance of Man (man's rôle as developer) and The Resilience of Society (the necessity for the survival of societies for them to come to terms with a finite earth, and the educational necessity for the cultivation of the geographical point of view and of the art of living in a small world with a large and fast-growing population). That serious matters impinging on the affairs of the individual as well as of the masses need not be dully discussed is evident in the crispness and humour of the writing, a humour, incidentally, that justifies its presence by making points much more telling. Because the book would give so much pleasure to so many it is a pity that, even by present-day levels, it is so highly priced.

N. P.

Geography, Justice and Politics at the Paris Conference 1919. C. Seymour. Bowman Memorial Lecture. 22 × 15.5 cm. iv + 24 pp. New York: American Geographical Society, 1951.

President Seymour of Yale here gives us a glimpse of his and Bowman's experiences at the conference which, according to the authors of 1066 *and All That* followed the "war to end war" by making the peace to end peace. We are given slight sketches of the best-known actors in that pitiful affair and are wisely told that anxiety rather than either greed or vengeance was uppermost in nearly all minds. The desire for ethnographic frontiers was natural among peoples who feared aggression and kept their leaders under the pressure unavoidable in democracies. We hope that future Bowman lectures will deal more directly with the work and thought of one of the best expositors of our subject.

H. J. F.

Stratigraphical Palaeontology: a Study of Ancient Life-Provinces. E. Neaverson. 2nd edition, revised and enlarged. 16 × 24 cm. xii + 806 pp. Oxford: Clarendon Press. 1955. £5 5s.

In 1928 Dr. Neaverson published the first edition of his *Stratigraphical Palaeontology.* Prior to that time works on stratigraphy or earth history had emphasized the sequence of rocks and had been content to give lists of fossils characteristic of each horizon. On the other hand works on palaeontology were based either on a morphological description of the fossils or an attempt to follow their evolution. Neaverson broke ground which was largely new in describing in sequence the fauna and flora of each geological period. Now after more than a quarter of a century comes the second edition which has swollen to a work of over 800 pages. A long introduction is followed by fifty pages on the preservation and distribution of fossils which emphasize the relation between fossil faunas and the habitat and the existence both of facies faunas and geographical provinces. Another sixty pages deal with fossils as guides to horizons. Then the main part of the book covers in order the faunas of the Cambrian, Ordovician, Silurian, and so on, to the late Neozoic. In contrast to the first edition, which was largely restricted to Britain and British fossils, the re-written book covers the world, and an interesting final chapter deals with the general relations of the continents and oceans. Though the structure of each continent is considered in outline, there is no attempt to produce palaeogeographical maps. The general conclusion is important: Neaverson rejects the former great land bridges advocated by J. W. Gregory, and equally the continental drift of Wegener—"On the contrary the evidence of marine faunas throughout the ages is consistent with the older view of stable ocean basins with fluctuating margins," with continents more or less in their present relationship.

Some idea of the scope of this great work is evident from the five indexes (invertebrates, vertebrates, plants, stratigraphical and geographical) occupying 66 pages—though strangely no general index or index to authorities. It is a standard source book of lasting significance.

L. D. S.

Land, Air and Ocean. R. P. Beckinsale. 14·5 × 22 cm. 370 pp. London: Gerald Duckworth & Co. Ltd. 2nd edition. 1956. 25s.

Although this well-known book, first published in 1943, has been reprinted three times in the interim, this second edition represents a complete revision. The book has been reset, thus enabling the author to rewrite and enlarge many sections, and to include three welcome new chapters: on river régimes, lakes and aspects of microclimatology. These three additions form the final chapters and are not inserted in what might seem to be more logical places in the systematic approach adopted in the book.

The book is on the whole clear and readable, although occasionally lucidity suffers from unavoidable compression—the result of an effort to be as comprehensive as possible within rigorously limited space. There are, it is true, a few gaps which a first-year university student might expect to see covered—there is no mention of pediments, for example, in the section on arid landscapes, and surprisingly the word "peneplain" appears only in a couple of casual footnotes. Nevertheless, a substantial amount of ground is covered, and the book is full of delightful illustrative facts, statistical and otherwise; we learn, for example, that central London loses 56 per cent of its sunlight in December through smoke pollution, and that if all the mineral salts present in sea-water were withdrawn, sea-level would fall by 100 feet. A particularly pleasing feature is the summary of the related features of human geography at the end of each topic.

The book is attractively produced; it has 32 plates, well chosen and for the most part clearly reproduced, and 140 line-drawings. There is a comprehensive bibliography at the end of each chapter, containing many useful references to important articles in periodicals. The book can be warmly recommended to sixth-form, training-college and first-year university students.

F. J. M.

Nuclear Geology: a symposium on Nuclear Phenomena in the Earth Sciences. H. Paul (ed.). 15 × 23 cm. xvii + 414 pp. London: Chapman & Hall Ltd. New York: John Wiley & Sons, Inc. 1954. 56s.

This book is to be welcomed in that it presents in a compact form much information that is widely scattered in other publications. A vast amount of information has been assembled and passed under review and some useful summaries are given of such subjects as the source of terrestrial heat, the flow of heat to the earth's surface, the method of determining the age of rocks and minerals and such practical applications as the nuclear logging of boreholes. Useful tables are given of, among other things, the individual age determinations of a number of rocks and minerals, the proportions of isotopes in common leads and the records of helium content of different materials. The book has both advantages and disadvantages of a symposium, advantages in that each section is written by a specialist in that particular branch and disadvantages in that, for that very reason, it lacks cohesion. Much of the book contains advice to students who already have some knowledge of the subjects dealt with, or comments on or criticisms of methods taken as being understood but not fully described. Consequently, while it can be read with advantage by relatively advanced students with some knowledge of physics and geology it is hardly sufficiently explicit for school use.

W. H. W.

Realms of Water: some aspects of its cycle in Nature. P. H. Kuenen. 16 × 24 cm. 327 pp. London: Cleaver Hume. 1955. 35s.

This is a worth-while book, readable and interesting. The title may convey a too limited view of what it is about. The reader will, in fact, find that he has an excellent text-book covering a large section of physical geography. It discusses matters meteorological and oceanographical as well as those concerned with ice, rivers, and underground water. The treatment is up to date, and the reader will soon realize he is getting rather a different point of view from that given in the usual textbook. Rivers and river development are for example, discussed at some length. Block diagrams, as used by W. M. Davis, are certainly introduced, but there are many others, and the instances taken to illustrate the text are for the most part new. Moreover, the writer often emphasizes aspects somewhat neglected by others. His account of waterfalls is a case in point, and to a somewhat lesser extent, his notes on the pattern of drainage systems.

The chapter on the oceans is very compact, and contains a great deal of information varying from deep-water circulation to ripple marks on the one hand, and to waves and wave action on the other. There is a valuable section on wind and tides in relation to the enclosure of the Zuider Zee, and the author draws freely on his experiences in the East Indian region. Professor Kuenen, in fact, writes very largely from first-hand experience: he is a well-known authority on coral reefs and oceanography, and he has travelled widely. Moreover, he is an experimentalist, and not content with sweeping generalizations. The emphasis on measurement is a feature of the book.

It is recommended for use in the advanced forms of schools, and in the junior year at Universities. An open-minded student of *any* age will read parts or all of the book with interest and there are few who will not also profit considerably by so doing. As in any book there are a few minor slips, but they do not detract from a welcome addition to geographical literature, both for the general reader and for the student who is about to begin advanced work.

J. A. S.

Frontiers of Astronomy. Fred Hoyle. 14·5 × 22 cm. xvi + 360 pp. London: William Heinemann Ltd. 1955. 25s.

Many who enjoyed Mr. Hoyle's broadcast talks will turn to this book and find a fascinating account of astronomy, again expressed in clear, simple language. They will notice quite a large number of changes in his ideas since the publication of *The Nature of the Universe*; this is hardly surprising in this field, yet Mr. Hoyle has a curious inability to suggest doubt. His argument seems complete and unassailable, although as reviews in other journals have suggested, much of what he has to tell us is, even now, under attack from his fellow workers. His strength and his weakness both stem from an easy use of carefully selected arguments that can be well seen by reading his earlier chapters on the earth. Here is a coherent and excellently illustrated account of some complex ideas, and for that we may be grateful, but it is not necessarily the whole story.

K. M. C.

A Handbook of British Flowering Plants. A. Melderis and E. B. Bangerter. 14 × 22 cm. 360 pp. London: Ward Lock & Co. 1955. 63s.

This book, for all its 24 moderate colour plates illustrating some 240 species of flowering plants and its 210 line drawings (also of fair standard), is a poor competitor in a keen field. It does not contain anything like the same amount of information as the standard flora, and the various families are dealt with unequally—the section on grasses, for example, is weak and inadequately illustrated. The book is merely a descriptive catalogue of species, the rarer plants being either dismissed with a brief reference or omitted altogether. There are no diagnoses of the genera or families. Yet the catalogue is introduced by an artificial key to the families, as in a conventional flora, implying that the user could track down an identification after the manner of an experienced plant anatomist. The text is quite inadequate for any such process, particularly in the hands of a person with little botanical knowledge. The pictures might decide the identity of a plant if it happened to be of a species which is figured; but what if it belongs to one of the 1,500 species which have no picture in this heavy volume?

For the equivalent of the cost of this book a geographer seeking guidance on British plants could purchase an excellent flower book, a complete handbook of the grasses, a reliable guide to trees and, for good measure, the best concise work on our native plant communities.

G. E. H.

Minerals in World Industry. W. H. Voskuil. 16 × 23·5 cm. vii + 324 pp. New York: McGraw-Hill Book Co., Inc. 1955. 43s.

This work has one advantage and all the disadvantages of a compilation of data from all parts of the world. The advantage is the availability within the compass of some three hundred pages of a mass of information about mineral working. Against this, however, much of the information was out of date before it was published (many of the figures relate only to the late 1940s) and, if one looks up any mineral or any area of which one has personal and recent knowledge, what one finds is usually deficient. For example, the entire British iron and steel industry is dealt with in half a page under the title "United Kingdom Steel Empire" (p. 54) and here we learn that the bedded iron ores provide four-fifths of England's domestic iron ore supply; this statement is some twenty years out of date, and since the last war the figure has, in fact, been about 97 per cent. Further, in another brief reference to British steel (p. 32) we find that "production fell off in the period just before world war II and indications point to a continued decline in the post-war period." Both these statements are quite untrue; it was just as well for Britain's war effort that, in fact, steel production reached a record level in 1937 which was almost equalled in 1939, whilst the post-war rise has been quite phenomenal with 1955 the highest ever.

Information on the Americas is naturally much fuller, and is supported by bibliographies to each chapter; but as most of the references are to American technical periodicals, they are not likely to be of much use to British teachers and students. Some of the referencing is very careless; the well-known *Geographical Review* consistently appears as *Geographic Review*; and two references to one of Dr. Stamp's papers, on pp. 115 and 130, differ from each other—and both are incorrect.

S. H. B.

Rice. D. H. Grist. 2nd edition. 14 × 22 cm. xix + 333 pp. London: Longmans, Green & Co. 1955. 35s.

The first edition of this book was noticed in *Geography*, vol. xxxix (November), 1954. The fact that a second edition has been called for within two years is indicative of the need for such a series as this, dealing with tropical agriculture and products of such supreme world importance as rice. There are considerable improvements in this second edition—one notices the influence of Pendleton in the details on soils—but the book remains very uneven. It is very good in the treatment of details of cultivation and handling, especially as seen in Malaya, but almost incredibly naïve in other sections. The author actually classifies countries climatically in distance from the equator (pp. 268–269) to show that countries with a temperate climate give much higher yields than those in the tropics. The magic limits of 40° N and S are stressed in the same paragraph as Italy's high yields from latitude 45° N. In these days when the very existence of Japan may depend on the determination of exact climatic requirements for rice, the whole subject is ignored. This was excusable in the first edition, but not in the second.

L. D. S.

World Sea Fisheries. R. Morgan. 15×22·5 cm. xiv+307 pp. London: Methuen. 1956. 30s.

The oceans and their resources have claimed increasing attention during recent years and since, hitherto, there has been no general survey of world sea fisheries, Dr. Morgan's book is to be welcomed. The approach is geographical and the author examines "the factors which create a fishery, limit its extent, determine its methods, and locate the fishing settlements." The volume is divided into three parts. Section One is concerned with the physical and biological factors: the organic processes in the sea, the causes of varying regional productivity, and the influence upon fisheries of the type of coast zone are considered. Section Two deals with fishing techniques and craft and their geographical distribution, the processing and marketing of fish and the location of fishing ports. Section Three studies the fisheries of the world region by region. The final chapter reviews some recent developments in the industry and their possible results.

The book is a comprehensive and nicely balanced survey. One could have wished for a little fuller treatment of the fisheries of certain regions, especially of China, which is one of the world's four major fishing countries but which is only briefly considered. Some discussion of the antics of the herring and the capers of the cod might, with advantage, have been introduced. But it would be ungracious to quibble over details and incidentals of treatment for this is a careful and sound study with many interesting and illuminating features which fills a gap in our geographical literature. The text is illustrated with diagrams, simple clear line drawings—many of native fishing craft—and some excellent photographs. There is a good index.

H. R.

Beyond the Tides. P. Street. 14·5 × 22 cm. 127 pp. London: University of London Press. 1955. 12s. 6d.

The natural history of those fish which are of commercial value in the seas surrounding the British Isles forms the main theme of this book. Beginning with a brief reference to the development of marine biology in the nineteenth century the author then describes and accounts for the distribution of fish off northwest Europe. Cod, plaice, herring and pilchard are each accorded a chapter, due attention being paid to the various methods of catching and marketing the fish. Vicissitudes of the British fishing industry are related to the rise and fall in importance of various fishing grounds, and changes in human taste.

Writing in non-technical language eminently suitable for pupils in secondary schools, the author blends effectively natural history and economic geography, with perhaps the latter dominant despite a prefatory note to the contrary. The two maps and all the illustrations relate to the fishing industry, and are of the type commonly found in a good grammar school book of the British Isles. Yet in view of the anatomical detail given in the text it seems curious that Mr. Street has not augmented his natural history with a few photographs or drawings of some of the species he describes.

L. J. J.

Adam's Ancestors. L. S. B. Leakey. 14 × 21 cm. xi + 235 pp. London: Methuen & Co. Ltd. 1953. 42s.

This is a new edition, very largely rewritten on the basis of 20 years' work. Pluvial phases in Uganda and Kenya are equated with glacial phases of northern lands, a promising if not fully established theory. Leakey himself makes stone tools and naturally lays emphasis on technique. He diminishes old-fashioned contrasts between core-tool and flake-tool cultures and advocates separate names for cultures and for periods, a necessity now that cultures are known over wide areas through which diffusion may have taken a long time. Man needed tools, probably stone tools, before he could become an eater of large mammals, as his hands and finger nails were not strong enough to skin big beasts. He also needed much improved tool-edges of the chisel kind before he could cut wood across the grain or work ivory or bone to much purpose.

Pithecanthropus and *Neanderthal* man are treated as very distinct specializations apart from *Homo Sapiens* and the question of hybridization is not raised. The Palestinian hominid skulls seem to be unmentioned. A minor mishap is that the book was in print before the recent Piltdown sensation, but Leakey is wise in treating the supposedly associated skull and jaw as a highly erratic find. The author's own finds of jaw and skull at Kanam and Kanjera in Kenya are justifiably treated as very ancient specimens, but he is rather brief about Boswell's hesitations concerning dating. The chapter on human types of the late Palaeolithic is very well done.

H. J. F.

Man in Evolution. M. R. Sahni. 14 × 22 cm. x + 272 pp. London: Orient Longmans Ltd. 1953. 15s.

This is an effort to give young Indian students a broad outline of the scientific view of world changes from hydrogen-helium masses to human civilizations. It would be easy to criticize the many short statements on topics needing volumes, but the author is trying to arouse interest and to help forward an interest in scientific observation and thought. About 80 pages are devoted to the Pleistocene sequences, chiefly in the Indian region and we are given several tables for glaciated and periglacial areas, the tables suggesting close resemblance to the European and African sequences of four glacial or pluvial phases.

The last section of the book deals with the skeletal remains of early man and his hominid relatives but in this field of study there is as yet no evidence from India.

H. J. F.

Readings in Anthropology. E. A. Hoebel, J. D. Jennings and E. R. Smith (eds.). McGraw-Hill Series in Sociology and Anthropology. 16 × 23 cm. xiv + 417 pp. London: McGraw-Hill Book Co. Ltd. 1955. 37s. 6d.

Our subject has made too little effort to get into the minds of other peoples, especially those of non-European tradition and our text-books often over emphasize economic production. This anthology should help us to correct our mistake in this respect. Dorothy Lee discusses the Trobriand Islanders on the basis of Malinowski's work and later discussion. Gluckman gives thoughtful summaries to Aubrey Richards' work on the Bemba (N. Rhodesia) and of Evans Pritchard on the Azande (Sudan). Those who read Clark Wissler's classic essay on the Horse and the Plains Indians will, one hopes, go on to study his books. Two or three essays are from Ralph Linton's brilliant mind, one of them on the 100 per cent American being most amusing, and suggesting the writing of an essay on the Englishman to parallel what Linton has done for his countrymen. A study of Aztec writing is fascinating, and several essays give warnings about muddles due to projecting our very highly conditioned minds into the translation of words of Polynesian and other languages. Another essay contrasts the long thin limbs of Dinka, Shilluk and Tuareg, promoting evaporation for cooling, with the short stocky Arctic peoples whose evaporative surfaces are much reduced. We get fairly near to the minds of American Indians in "Teachings of My Father" by Crushing Thunder, and in "The First Tipi," written by Alice Marriott. Washburn's essay on the new Physical Anthropology marks a promising advance towards genetic work, the only long-term hope in this field. Oakley on Making Stone Implements is as good as one expects from him. On the whole the essays give a good sample of research in many fields by people on both sides of the Atlantic. A few of the essays do not quite justify their inclusion.

H. J. F.

The Teaching of Geography. G. H. Gopsill. 14 × 22 cm. xi + 316 pp. London: Macmillan & Co. Ltd. 1956. 25s.

Mr. Gopsill has written an interesting book on the teaching of geography that teachers will find helpful. The introduction suggests that the book is intended mainly for students, but teachers of experience will be able to pick up many ideas from, for example, the sections on Illustration in Geography Teaching and Planning and Equipping a Geography Room; and the appendices on books for general reading, sources of geographical illustrative material and, particularly the operation and maintenance of optical apparatus are most useful. Indeed, the book is perhaps more suited to experienced teachers who have got over the difficulties that often beset beginners and are alert to examine fresh ideas critically. Students might well find parts of the book rather vague and feel that the author takes rather too much for granted; for example, it is not always clear what age group is being referred to; there is not much advice on the organization of field work in the secondary school although its desirability is stressed; and the chapter on planning the Geography Syllabus is mainly descriptive rather than critical.

Mr. Gopsill obviously has a real feeling for the value of geography in school but the conclusions he draws from his short introduction on the Nature and Scope of Geography in School are not clearly evident in all the practice that he discusses in the rest of the book. He seems, for example, often to lose sight of the geographical synthesis, and in the most detailed and in some ways the most useful section of the book on Illustration in Geography Teaching, he appears to lose sight of what he is trying to teach. Clearly, he understands that he is trying to teach facts better and to achieve a worthwhile attitude in his pupils' enquiring minds, yet in the hands of an uncritical young teacher, his advice might easily degenerate into "teaching visual aids instead of geography" so that the aids become an end in themselves rather than a means to an end.

It is a pity, too, that the atlas and textbook do not receive more attention; that the value of sample studies is not stressed more; and that the external examinations and work in the sixth are practically ignored. Despite these criticisms, however, there is much of value in the book. Mr. Gopsill calls upon a wealth of educational writing in support of his discussions; he treats projects with realism; devotes an interesting and worthwhile section to individual assignments; and has some valuable suggestions to make on the use of topical events in the teaching of geography. Most teachers of geography, too, will agree that, "although geography has a great deal of common ground with other subjects, it is possible to force a correlation between them beyond the limits of what is desirable or expedient." But perhaps the most valuable feature of the book is Mr. Gopsill's insistence throughout that the teacher is concerned with both children and geography; to neglect one or the other is to ruin one's teaching.

R. C. H.

The Colonies. A guide to material and information services available to schools and to the public. Colonial Office and C.O.I. 13×21 cm. 36 pp. London: H.M.S.O. 1956. Free.

The offices of national and commonwealth organizations and official departments are frequently bombarded with letters from school children who have been set to work on a project and are seeking information assiduously if blindly. In order both to assist teachers planning such projects or illustrated lessons, and to try to reduce the number of enquiries, often duplicated unwittingly, the Colonial Office has, with the assistance of the Central Office of Information, issued a pamphlet *The Colonies*. This is a 36-page catalogue giving details of many official publications, including a wide range of booklets, filmstrips, picture sets, posters, and maps published by H.M.S.O.; films on hire from the Central Film Library; visual material available on loan from the Imperial Institute, the Royal Empire Society and the C.O.I. Regional Offices; and a useful list of sources of information on particular subjects and of addresses of the offices of the Colonies in London. One can learn how to make personal contact with students from the Colonies working in this country and how to seek school children correspondents in the Colonies. Sources for advanced studies, statistics and periodical reports are of special use to teachers, college students and sixth form pupils.

Teachers can save much official time and postage by obtaining material for their pupils and here is a guide to help them. It can be obtained free of charge from Circulation Section (D), Central Office of Information, 83 Baker Street, London, W.1.

M. O.

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